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Volume 18 SEPTEMBER, 1935 Number 9

THE COMMUNITY VERSUS TUBERCULOSIS*

Some Phases of the Campaign

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Ninette, Manitoba

EVEN fifty years ago community health as a result of community planning was a comparatively new idea. Health departments were new fads of a few governments. They were given back offices and a trifle of spending money, and thought of as a kind of special police, posting diphtheria placards and prosecuting owners of nasty back yards. Now they are toxoiding children to prevent disease and have hitched their wagons to the star of Pasteur—all germ disease banishable from the earth, therefore all germ diseases to be banished from the earth.

It was when Public Health was in the poor back street that intelligent good citizenship waked up one morning to find tuberculosis, an abandoned waif, crying on its doorstep. Nowadays we know that this is after all a legitimate child of official Public Health, but at that time, with all the other hungry mouths to feed, nothing could be done for this one that promised to be a fastidious and costly child, and hard to bring up.

So Mr. and Mrs. Good Citizenship took in the waif and in all these years have done remarkably well by it. Private effort, private money, private enthusiasm have been poured into this cause. It has got itself into the head, the heart and the imagination of the public as no wholly state-devised or municipally-supported cause ever could. Now that its parentage is pretty well acknowledged, and its parents have become better off, the prodigal has returned many times to official Public Health, asking for many fatted calves, and with not a little grouching of jealous elder brothers.

But after all it was fortunate for all concerned that the waif fell into the lap of the generous public. It introduced the rest of the Public Health family to the foster parents. Every dollar spent against tuberculosis has been a double dollar, giving full value in anti-tuberculosis betterment, and full value besides in general health betterment—in clean mouths, clean bodies, clean houses, clean factories, clean streets, clean foods, clean milk, tuberculin testing of cattle, pasteurization, all advertised and stimulated by the tuberculosis campaign. Most valuable of all have been the open window, the marvelous uses of rest in disease prevention and cure, the fatefulness of conservation or waste in work and play. These are all older than Hippocrates, but in our own day they all had to be newly discovered and in our own day they are very largely internal secretions formed in the special organs of anti-tuberculosis work and thrown most usefully into the general circulation of medical science and into general ways of life and living.

About one thing there is no doubt whatever. Anti-tuberculosis effort is grown-up enough, old enough, wise enough, broad enough, important enough, separate enough and specialized enough, and enough of a going concern to have its own house, its own place of business and its own independence. The tendency which broke out in the East, to put anti-tuberculosis again under guardianship of Public Health may be logical, but, like many other logical things, is wrong, and a turning back of the clock. It may come when tuberculosis is just about finished, but that won't bother our generation.

*Presented before the Trudeau Society at the Curtis Hotel, Minneapolis, January 26, 1935.

General Principles

In every area we are covering, whether by the patchwork quilt kind of covering that I know best, or any other kind, there are at least two principles that are absolutely essential. The first might be called Central Bookkeeping, getting central agency records of every focus, every death, every case, every contact, every suspect, every clue. The second is Central Responsibility —responsibility of the Central Agency for getting the right thing done with every focus, every case, every contact, every suspect, every clue. If we have these two, all things can be added unto them.

A plan, whatever it may be, is merely a tool, like a spade or a sickle, which needs some person at the business end of it. A plan is not an automatic robot. And a plan is not a golden calf to set up and idolatrously worshipped. I am always half suspicious of the modern phrase "set-up" for fear we should bow down before the "set-up."

The only way to do work is to do it, and a man out all day with a spade will have turned over more earth by evening than a committee that has held discussions all the livelong day about the trituration of the soil.

The Travelling Clinic

If we are to speak about tools I will have to report that up in sparsely-settled Canada we find the need of travelling clinics, and that the nine provinces have evolved nine different varieties of such clinics. The essential fact is that we don't expect the contacts or suspects to find themselves or to come to us; we find *them* and go to *them*. In Manitoba half our small population is at one urban center. In the rural half and the hinterlands our clinics examine one person in seventy or eighty each year. The associated clinics of Greater New York examine one in 140 each year, just about half as many.

The Clinics are not publicly advertised, for the general curious public is not wanted. Lists of people who should be seen are suggested from the Central Bookkeeping records already mentioned. These are discussed fully with the local doctors, and added to, and the "invitations" taken or sent out by the Public Health nurses are all signed by local doctors. Reports are sent back to the doctors, and by them are given out, usually in an interview, not in writing, to the persons concerned. This brings each person examined into touch with his local doctor. A report with certain "ifs" and "buts" that would be hard to write for people of doubtful intelligence the doctor can put over in an interview.

So the doctor sends the people for examination; he gives them their reports, watches any who need watching, and is the local "agent" throughout the year. The Clinics are planned to be, and are, consultations with the local doctors. The scattered Public Health nurses are in touch with the people of all the Clinics also, though they are now so few that anything like adequate supervision cannot be given.

Excluding the services of Public Health nurses, but including all other costs of personnel and material, including films and processing, the average cost per person examined during the year has been as low as $1.27 and usually below $1.60.

The Clinics find tonsils, adenoids, teeth and many other things the people should have brought to the local doctor, but have not. He is usually a busy man for the next week or two. The Clinics bring many people to the doctor, tuberculous and non-tuberculous, who were not in touch with him but who need to be.

The work cannot be perfect. Examinations have to be hurried, but a good x-ray plate is the best safeguard against mistakes. Sometimes the most suspected family fails to come, and must be angled for diplomatically, or, if on any public relief, perhaps pushed in by provincial authority.

To Pay or Not to Pay

To pay or not to pay, that is always a vexing question. I have the general direction of three agencies for examination, the Sanatorium at Ninette, the Central Tuberculosis Clinic, and general clearing house in Winnipeg, and Traveling Clinics. The rules for the three are all different, and are different in order to be consistent with principles that are the same for all. These principles can perhaps be best discussed with the three associated agencies as examples.

All three demand that the patient shall be sent by a doctor, and will even go to the expense of a long distance 'phone call to connect up a

doctor with a patient who has come for examination "on his own." All three insist on making the report to the doctor, directly if possible, but always in writing in any case. So all three are consultation stations for doctors to use.

The Travelling Clinic examinations are entirely free, and money offered would be refused. We cannot afford to make distinctions between a pay class and a non-pay class in a community where everybody knows everybody. We cannot afford to have people stay away rather than pay. When a large family connection has been exposed we *can't* afford to have them raise the question of what they *can* afford.

The Central Tuberculosis Clinic is different. It is in the city only a few blocks from men of special experience, and plenty of x-ray plants, downtown. Any who can pay for special experience in private practice, should do so. We insist, therefore, that the doctors should send to us only those who cannot or should not pay, and we make no charge. Often the discovery examination is made in private practice, but the shoal of contacts, the Public Health part of the job, is sent to us. We refuse to make examinations for pay because this would bring us into opposition with men of special experience and equipment. As long as we deal with the non-pay classes only there is no difficulty.

At Ninette, however, we are in the heart of the country, 150 miles from the big centre. Apart from ourselves, the nearest chest specialists are at the State Sanatorium of North Dakota. Here, we consider we should not exclude from examination people who, if they were in the city, should pay. So we charge or do not charge according to circumstances. However, any of you who know the depression, drouth and grasshoppers of the prairies, the eagerness of our organization's missionary spirit, and the responsibility we accept for the whole province, will not need two guesses as to whether our diagnostic work is done more with pay or without pay.

If we are not prepared to pretty much give diagnosis away we are going to be a very long time in getting tuberculosis stamped out. Diagnosis bought and paid for, as groceries over a counter, won't get us very far among contacts and suspects and nowhere at all in surveys.

Sanatorium and Travelling Clinic

I suppose travelling clinic work can be done without a Sanatorium as base, but if I were as Calvinistic as my upbringing by an Aberdeen ancestry, I would consider these two as foreordained for one another from the very beginning of the world. Almost every Sanatorium serves a special parish or field. Why should it not be the chief cultivator of that field? It is a fine fortress with all sorts of fighting power, and a great place for general headquarters. Why should it be merely a base hospital for the wounded? A Sanatorium doctor should know the firing line as well as the fortress; should know the homes his patients come from and go back to; should consider waiting lists as well as ward lists; and work out general strategy for combatants as well as care of sick and wounded. When a Sanatorium can take care of field work by stretching staff and facilities just a little it is uneconomic to pile up an entirely new overhead. Our Sanatorium men come back from clinics better Sanatorium men, and better campaigners against tuberculosis than when they went away.

The Travelling Clinic is of special value as a skirmishing unit in the hinterland settlements. There are slum areas in country as in city. Among these with us are the Indian reservations and other areas of Indian admixture. We infected the Indian and he is now unwittingly, but ignorantly, bringing the infections back again to us with accumulated interest. With new ways of transportation and the opening up of the North, the Indian even on reservation is no longer a segregated person. Indian settlements are leaking tanks of all infections. In Manitoba our reservation Indians, slightly above 2 per cent of the population, have 31 per cent of the tuberculosis deaths, and the total of Indian race, about 5 per cent of the whole population, have 45 per cent of the tuberculosis deaths. Indian people do not respond so very well to treatment, but Indian settlements respond well to preventive measures.

The Practitioner and the Campaign

It is a truism that the best of all health officers is a disease-prevention-minded general practitioners, especially in the country. And it is also a truism that the anti-tuberculosis campaign

would be paralyzed and futile without the full coöperation of the general medical profession. It is a matter of utmost importance, therefore, to discuss just the part the local doctor should play.

There are a number of general considerations. In the first place, as I have already said, leadership in the campaign is necessarily the business of a medical group of special experience, mostly employed in public capacities, such as Sanatorium men, on full time. There are men of special experience and leadership in tuberculosis also, sometimes very eminent, who are altogether or in part in private practice. But even this combined expert group is necessarily not very numerous. Apart from these, doctors differ widely in their types of practice and their knowledge and facilities for this special kind of work. I went over the list of doctors in Winnipeg recently and found that each morning after breakfast 300 doctors went out to eighty different types of work, the obstetricians of course having been out before breakfast.

In something more than a quarter century of tuberculosis work I have tried to avoid calling tuberculosis a specialty, or myself a specialist. There is no medical practitioner, obstetrician, insurance doctor, medical journal editor, surgeon, pathologist, ophthalmologist, or medical man of any kind who must not know something worth while about tuberculosis if he knows his own job at all, and all must always be on the alert for it.

But that does not mean that any of these good men taken at random could or should try to make decisions along the boundary line of contacts and suspects, as to which are clear, which are definitely diseased, which have slight or old inactive lesions, which are infected, and what they should all do about it. We concede readily that special training and experience are needed for one who would treat tuberculous people in a Sanatorium. But very special training and experience is not more needed in Sanatorium treatment than it is in border-line diagnosis. Medical practitioners are getting much better in their diagnosis of frank tuberculosis, but they simply can't deal with the border-line cases, and they know they can't. Of a whole expert staff it should be the most expert who should be assigned to the border-line work, and given the best facilities.

The local doctor, without special experience and without facilities, cannot do that most difficult and exacting and important job. A short brushing up will not make him able to do it, though it will make him more interested, and a better coöperator with those who can do it.

Quite apart from his experience or inexperience there are other reasons why the local doctor cannot do the border-line job. He never has done it. From Hippocrates until now it has been his job to deal with present disease, not future possibilities in disease. His first question for twenty centuries and longer has been, "What ails you?" and if nothing ails you, why should you go to him? On the other hand, almost the only interest of the anti-tuberculosis campaign in the sick man is to segregate him, and its great work lies with the people who are not sick. This is something new in medicine that the medical armamentarium of teaching and training and the medical point of view and psychology are not prepared for. It is something new in medicine that the social adjustments of medicine, even the ethics of medicine, are not prepared for. The doctor must not solicit patients. He must stay in his office until the patient solicits him. He simply cannot gather in all the well people in the Jones connection for examination in his office at so much an examination, and get away with it. A clinic or sanatorium group are expected to do that very thing. It is their job. If they don't do it they are criticized in the community for not doing it as a practitioner would be for doing it.

An outsider in a public service, and with special training, can do what the local man could not possibly do both in getting people in, and in giving them a worth while decision along this difficult border line, once they are in. In my experience no man in the community appreciates this expert service, with x-ray and all the rest of it, so much as the practitioner himself. That Jones focus of infection and possible disease has been a sort of community chestnut burr that he could not open, a challenge he could not take up. And to have the problem worked out with him, and for him, and all who need his care sent to his office, and put under his care

in the orthodox way he considers a very great service.

Looked at superficially it may seem that the anti-tuberculosis campaign, with its specially trained groups, has taken away from the work and the prestige of the local doctor. As a matter of sober fact it has added immensely to both. Before the campaign, the "consumptives" were brought to the doctor either already galloping toward the grave, or travelling the same road more slowly in chronic bilateral disease. Such cases were all grief to the doctor, and no credit. So much was this so that it was the fashion to send them all to other climates, *any* other climate, *anywhere*, so long as they were far enough away. When they returned it was the undertaker who was in charge.

After twenty-five or fifty years of campaign, conditions are very different. A number of men, it is true, have been removed from general practice to give leadership in this phase of work. Patients are not sent south to die but to nearby Sanatoria to get better. The life of a tuberculous man, as I've no doubt you know, is divided into two parts: first, the time before he has tuberculosis; and second, forever afterwards. Only a comparatively small part of that "forever afterwards," on an average, is spent in sanatoria. The rest is under the supervision of the local doctor. And in the case of known contacts, or known slight lesions, even the pre-tuberculosis period is brought to the doctor's office also. The Manitoba Travelling Clinics, after a few years on the job, had about 500 known tuberculous people in the doctors' hands five years ago—old Sanatorium patients, healed lesion cases, etc. In the succeeding five years that number was raised to more than 1,600. In this five years, and not the beginning five at that, the clinics increased the local doctor's tuberculosis practice three-fold, left him with three patients to look after for every one they had found him with—and even that one they had found for him, for the most part, in previous years of clinic work. So the anti-tuberculosis campaign is not taking work away from the doctor, but putting work into his hand, not taking away patients, but sending patients to his office. It is not sending him grief and incurables, but work he can do and do with credit, and it is giving him an expert partner in this work who does not need to be paid, indeed will not acept pay.

Of all tuberculous people who need to be watched, and examined and advised from time to time perhaps not 10 per cent are in sanatoria or hospitals at any given time. The others all should be in touch with local doctors. So if the only consideration were the local doctor's share in tuberculosis work it would be at its greatest when case finding was at its best. If quantity of practice were the only consideration the local doctor could very well afford to pass up border-line diagnosis, and have the tuberculous people found for him by more expert diagnosticians and sent to his office for him to take general care of. This is in the interest of the campaign also.

One question concerns what our legal friends would call the onus. Should the onus of case finding be, as it is at present, upon clinics, sanatoria, central agencies with experienced and expert staffs? Or is it to be given to the general practitioner? I believe strongly that the onus, the chief responsibility for diagnosis, prognosis, and important decisions along the contact border line should as far as possible remain with the more expert and better equipped staffs, under the control of the central organizations, but working with and for the practitioner. I do not think that the onus of case-finding and its more difficult decisions should be delegated to the general practitioner unaided, however many refresher courses in tuberculosis he may have had. or even if he should have an x-ray outfit. I believe, moreover, that with the onus on the practitioner not only would the cause we serve be the loser, but the practitioner also. At the same time it must be well understood that the patients belong to the local doctor and not to us. We are in consultation with him and the patients are his patients.

There is another consideration. In the past half century two great movements are revolutionizing our art. One is the marvellous advance of medical science. The other is the changed attitude of the people toward the distribution of medical science for the needs of the people. About what medical science shall be, we have the last word. But about how we shall distribute medical science in public services or by private arrangement, in that matter Democracy has the

last word. Democracy has landed on all fours right in the middle of the distribution of medical science, and is there to stay. If the people decide, as they certainly would in Manitoba, that they are going to have the advantages of specially skilled agencies on this difficult diagnostic border line, then they are going to have them sooner or later, whatever we may resolve or plan. Our profession may propose, but Demos will dispose in this matter as in many others. We have said for centuries, "salus populi suprema lex," the welfare of the people is the highest law. So it is. And now democracy has started in to see that this highest law is enforced. What is best for practice is not now the big question and never again will be. The big question is, and will be, what is best for the people?

The Public Health Nurse

One important matter: We must be careful that the most useful and indeed indispensable worker, the Public Health nurse, does not become a liability instead of an asset by unnecessarily arousing the antagonism of doctors. It is true that there are many situations in which antagonism can develop very easily. I have already said that a public service or voluntary service diagnostician along the contact border line is merely a consultant. The patients are the patients of the local doctor. Realizing this will keep our attitude correct, as between doctor and doctor. We will consult the doctor about seeing *his* patients, and will report our findings about *his* patients to him. If a Public Health nurse will only think of the patients in the same way, and courteously consult with the doctor about *his* patients, realizing that they are not, and never will become, *her* patients, however poor and dependent they may be, half the difficulties of Public Health nurses in relation with doctors will vanish. After all, nurse etiquette in these matters is just physician-consultant etiquette.

Results

How shall we measure results? In a quarter century our big concern has passed from the diseased person to the infected group. We are applying prevention, cure and prognosis not only person by person but province by province, and state by state. Deaths are getting fewer, cures and half-cures are increasing, but the big intangible fact we can scarcely measure by any statistics is about the gross total of community infection. Is it getting noticeably less? It think it is.

We look on the whole mass of citizenship as a unit. That is a mistake. In Manitoba, for instance, anti-tuberculosis effort began twenty-five years ago. In comparable populations the tuberculosis death rates has been cut down to *one-fifth* in that quarter century. Not so bad! But really it is better than it seems. Who are the people whose decreasing deaths we are counting? Some were middle-aged before our work began. Young adults then are only in mid-life now. More than half our present people were pretty well tarred with the old stick. Less than half of them have been much affected by our cleaning up of infections. Each year that comes gives the babies, the budding flowers that make their own springtime wherever their glad faces appear, a cleaner and ever cleaner world to be born in, grow up in and in turn have babies in. We are doing not badly considering the old pre-sanatorium, pre-clinic, pre-campaign population we still have. The best results of what we *have already done* won't be apparent for another quarter century. I firmly believe—perhaps it may be put down as a tentative law—that *wherever tuberculosis deaths in a whole population of mixed ages has been cut down to one-fifth, the tuberculosis menace to children now being born has been cut down to one-tenth or less.*

Thus year by year, in the very flow of the generations down the river, below the kirk, below the mill, below the lighthouse top, into the great broad sea—all that is old passes gradually and quietly away, and all things become new. To heal a sick man of the generation before last is something; but to make the world a cleaner birthplace for the children of today and tomorrow is *everything.*

SIDE-VIEW SKETCHES OF PHYSICIANS*

ARCHA E. WILCOX, M.D., F.A.C.S.
Minneapolis

BY precedent the time has arrived for the president's address, a custom for which I am not entirely responsible.

In assuming this obligation, it has required considerable courage on my part to reach a decision as to which road to travel, and in what place to stop. However, as there seemed no way to turn back, I have endeavored to reach my destination, through highways and byways, many times laboriously retracing my steps, but diligently carrying on.

This irregular course, much to my liking, has taken me through strange lands, as well as familiar places. By journeying along the out of the way biographical lanes and not adhering to the usual historical highways of travel, I have discovered many views of the physician which differ from the familiar side he usually exhibits in his routine scientific pursuits.

"Human conduct affords the best raw material for the novelist."[2] Therefore, is it little wonder that the physician has taken such an active part in literature? Certainly from his daily experience and application of his art he comes in contact with material, the rawest of the raw. Who more than the physician is closer to, more familiar with, or has greater opportunity to collect genuine themes of life's activities? He learns about life, observing the beginning at birth, the suffering en route, and the termination at death.

I have to a considerable degree become more or less convinced that authors and biographers aspire to present a literary composition of acceptable style, creditable to themselves, and pleasing to their readers, rather than frankly and courageously to paint a life-like word picture of the gone but not forgotten man. Recording the accomplishments of celebrities and the memorable deeds of distinguished men is of the greatest value to posterity; but what of the man, himself, his intimate social activities, environment, activating influences, ambitions, avocations, and emotions? He must have been human, he had feelings; undoubtedly he experienced romance and adventure.

The lapse of time softens much the hatred between individuals as well as nations. Neighborly feuds eventually become unraveled. But, on the contrary, historical anecdotes, frequently through repeated recitals, become much embellished by enthusiasm, inflated by imagination, or disfigured by handling; thus making it doubtful, if not impossible, for the offspring to recognize his own mother.

Rabelais

That monk, Rabelais, physician, roving secular priest, master of sciences, linguist, philosopher, creator of Gargantua and Pantagruel, was above all a humorist. His religious activities, philosophy, and science all find their outlet in his humorous writings. His humor made him a good mixer, his roving adventures brought him in contact with all walks of life, and there is little doubt that he joined in the revelry of life to a degree that his experience therefrom became of the same dimensions as that of his intellectual development, and from these experiences and observations, his humor and satire found full expression in his criticism of the church, state, and judiciary of his time.

In creating Gargantua and Pantagruel he produced a medium through which he obtained great amusement in exploiting his philosophy and humor. Pantagruel became his loud speaker, propagandist, alibi, and master. In modern terms, Pantagruel was his broadcaster and publicity agent. The mythical character, Paul Bunyan, of colossal size and marvelous deeds is undoubtedly a modern revival of this historical monster. It is quite apparent that one of Rabelais' objects, in creating this fanciful monster, Pantagruel, was to attract personal attention and financial profit, through him. In this he did not fail for we have it on record from him that his book was one of the "best sellers." "More copies were sold in two months, than of the

*President's address before the Minnesota Academy of Medicine, January 9, 1935.

bible in nine years." He had a keen nose for business and a deft appreciation of the susceptibility of the people, capitalizing his "jovial and laughter-loving doctor's temperament."

In the last chapter of Book II he says, "If you say to me, Master, it would seem that you were not very wise in writing to us these flim flam stories, and pleasant fooleries; I answer you, that you are not much wiser to spend your time in reading them. Nevertheless, if you read them to make yourselves merry, as in manner of pastime I wrote them, you and I both are far more worthy of pardon, than a great rabble of squint-minded fellows, dissembling and counterfeit saints, demure lookers, hypocrites, pretended zealots, tough friars, buskin monks, and other sects of men, who disguise themselves like maskers to deceive the world."

I have not felt the time wasted in reading Rabelais' writings nor have I deplored the effort expended in following his biographers and critics to prove him saint or sinner, clown or counsellor, charlatan or humanist. He was a man of many parts and sides, geometrically an octagon, and in many respects a victim of intelligent development far beyond his time, full of the appreciation of life. To me, he put far more into life than he took out. Irrespective of his many critics, he left a heritage of good humor, wit, wisdom, and common sense, which could at the present time, if properly interpreted, be well appropriated for enjoyment, profit, and spiritual help.

Thomas Dover

There is a period of fifty years, spanning the close of the 17th and the beginning of the 18th Centuries, during which piracy was in bloom. Hurd refers to it as the "reign of the pirates" and during these years rollicking romances of the sea, blood curdling tales of freebooters, and the deeds of predatory and plundering Buccaneers afford sufficient daring, illegal, and immoral action, to satisfy the wildest imagination of the old as well as the young.

One of these Buccaneers was a physician, Thomas Dover, by name, who was born in 1670 and died in 1742. For my intimate acquaintance with this gentleman of the old school, I am indebted to Sir William Osler, whose fascinating essay was published in the Johns Hopkins Bulletin, 1895.

When I was a student of Materia Medica and learning to mix ipecac and opium, I did not know that the concoction which was called "Dover's Powder" originated in the adventurous mind of a Buccaneer, nor did I dream it would be rediscovered or reborn in the 20th Century as a specific for the common cold.

Thomas Dover, therefore, comes down through history to us in "powdered form"; yet, with the virility of the swashbuckling Buccaneer whose daring adventures as "third in command, and one of the principal owners and president of the Council of the Duke and Duchess Privateers of the ancient and honorable city of Bristol" provides a special and dramatic chapter in the history of this period.

Thomas Dover practiced medicine in Bristol, and, strange as it may seem, made money, and joined with some merchants in a privateering expedition in 1708.

There was in Bristol at this time, a William Deering who had sailed the Spanish Main. He agreed to accompany Captain Woodes Rogers as pilot of the expedition promoted by Dover and his associates. It was during this expedition that, off the western coast of Chile, on the island of Juan Fernandez, the lonely Scot, Alexander Selkirk, was discovered. This event proved to be the spark exploding the imagination of the indefatigable writer, Daniel Defoe, resulting in the immortal story of the "Life and Strange Surprising Adventures of Robinson Crusoe."

From this view of the side career of Thomas Dover, I am reminded "there is honor among thieves" for history states that of the properties peculiar to Buccaneers, one was their manner of dividing the booty gained by plundering sea coast cities, and ships on the high seas. "Everyone who had a share in the expedition swore that he had reserved nothing of the plunder. A false oath was of extremely rare occurrence and was punishable by banishment to an uninhabited island." "The wounded first received their share, which was greater according to the severity of their wounds. The remainder was divided in equal parts and distributed by lot." (This may have been the origin of the fee-splitting system.)

"Religion was strangely blended with their vices and they began their enterprises with a prayer." The spoils, however, were dissipated in most depraved manner.

Samuel A. Mudd

On April 14, 1865, President Lincoln was assassinated by John Wilkes Booth, at Ford's Theater in Washington. That frightful event threw the entire nation into deep mourning, and marked the beginning of a strange and horrible tragedy in southern Maryland.

Following the shooting, Booth jumped from the President's box to the stage of the theater, and fractured his leg. The excitement and astonishment of the players, as well as that of the audience, evidently assisted in his escape. Booth was able to leave the theater through a rear stage door, and, abetted by a confederate, David E. Herold, mounted a horse and rode away in the night. They traveled South into Maryland. For thirty miles Booth endured the pain in his ankle but at four o'clock in the morning he stopped at the home of Dr. Samuel A. Mudd and requested treatment. Dr. Mudd, a respected, popular, and well to do country practitioner, treated the patient and, after a few hours' rest, the two conspirators rode away.

Later in the day, as the news of the President's death spread throughout the country districts and reached the ears of Dr. Mudd, he immediately became suspicious and, driving to the county seat, he reported his experience with the then unknown patient to the authorities. Instead of receiving their gratitude, he was forthwith taken into custody. The country was in a blazing rage, passion was unbounded, and vengeance permeated the air. The fact that Dr. Mudd had seen and treated Booth was sufficient to spread the impression that he was at fault; and, if not guilty in assisting in the crime, had aided in the escape.

He was tried by a military commission, convicted largely on negro evidence, declared guilty, and sentenced to life imprisonment. In due time he was committed to Old Fort Jefferson to serve his sentence.

An interesting and vivid description of Old Fort Jefferson is given by George Allan England in his "Isles of Romance—Tales of Tortugas." Fort Jefferson is located in the Gulf of Mexico, one hundred and twenty miles out at sea, off the coast of Florida, on one of the Isles of Tortugas. "No more desolate place of imprisonment could have been found within the limits of the United States." In this desolation the unfortunate doctor began to serve his sentence and to pay the penalty for debts he never contracted, and for crimes of which he was entirely innocent.

England, in his "Tales of Tortugas," quotes freely from the letters of Dr. Mudd, written while in prison to his devoted wife. These letters, preserved by his daughter, record an experience of misery, mental, and physical suffering almost beyond human belief. They elicit from the reader the utmost resentment and a pity of unmeasurable depth.

Upon his arrival at Tortugas in July, 1865, he was assigned to duty as a hospital orderly at the Fort. From these menial duties, with several companions, he made an attempt to escape, was captured, and rewarded by adornment of heavy chains and placed in a filthy dungeon, his description of which rivals that infamous Hell Hole of Calcutta. There he suffered from hunger and thirst, the irritation of vermin, bites of insects, filth, and dampness. To add to his physical distress, picture the humiliation of a southern gentleman in these surroundings, with negro guards. For sixteen months under these conditions he merely existed and then was transferred and assigned to work in the carpenter shop.

Yellow fever became active in the South and Old Fort Jefferson was invaded by an enemy with which it could not cope. The suffering among the officers and soldiers became pitiful. The fort physician died and Dr. Mudd, in spite of his degradation and ravaged physical condition, volunteered to serve as garrison physician. He was then allowed the freedom of the Fort, took complete command of the situation and plunged into the work without thought of self. Truly a magnificent example of fortitude, sacrifice, and heroism, he worked night and day. He suffered an attack of the fever, recovered, and took up his tasks again. The ravages of the fever were dreadful. At one time only ten of the officers reported for work. Guard duty was suspended and, had he chosen, escape would probably have been comparatively easy, but the Doc-

tor felt his services were needed and, therefore, he remained on duty. After the epidemic abated his sacrifices and services commanded the respect and deep gratitude of the surviving soldiers and, unknown to him, they sent a petition praying for his pardon to President Johnson, but ill luck for the time pursued him. The original petition, through the hazards of administrative red tape, failed to reach the President's attention and Dr. Mudd was ungraciously demoted to his former status, to assume his former duties, and abide in his cell.

What punishment! Over his cell door he scratched the following words, "All Hope Abandon, Ye Who Enter Here."

In 1869, President Johnson pardoned him. Dr. Mudd, weak, broken in health and spirit, returned to find his farm devastated and his home gone. He never regained his health, but made an attempt through sheer courage and determination to reestablish his practice. Devoting his remaining thirteen years to the suffering, he died from pneumonia contracted from exposure in a severe storm while responding to a night call of one of his patients.

Oliver Goldsmith

A tabulated résumé of Oliver Goldsmith's career affords a conglomerate collection of vocations and avocations during thirty-one of his forty-six years of life which is anything but creditable. Johnson said of Goldsmith after his death: "He was a plant that flowered late; there was nothing remarkable about him when he was young." "Although the traits and dispositions of the boy often afford indications of his future character, it is impossible to predict what the future man will be."[7]

A sensitive youth, born in Ireland, November 10, 1728, early he showed fondness for music, learned to sing and dance, and play the flute. The story is related by one of his biographers, about one of his friends, who, wishing to test Goldsmith's knowledge of music, presented him with a piece of music to prove his ability to read the notes. Goldsmith placed the printed sheet, upside down, and made sweet melody upon his flute, but it is not stated whether the music which he played came from the notes he had in front of him or from his mind alone. Certainly he was not made of barren clay, for his mind was of fertile soil upon which the seeds of the fundaments of the French and Italian languages took root, and he became proficient in both, subsequently to put them to good use.

At the age of nine he exhibited the talent of repartee, a delightful example of which was manifested in his pat retort to an older boy who was playing the music to which Goldsmith was dancing the hornpipe at a children's party. The older boy made some remarks about Oliver's disfigured, pox marked face, nicknaming him Æsop. Oliver finished his dance, then, directing full attention to the older boy musician, and in dramatic fashion said,

> "Our herald hath proclaimed the saying
> See Æsop dancing, and his monkey playing."

Goldsmith's family was very poor, and remained so. Had it not been for an uncle who possessed some means, and who never lost faith in him, it is doubtful if he ever would have had the schooling, such as it was, that he obtained.

While making the trip to attend his last year of school at Athlone, he had in his pocket a guinea, given him by a friend. Of Oliver's many weaknesses, was the love of grandeur, dress, and position. The guinea in his pocket gave him a feeling of affluence, and he inquired, when reaching the town of Ardagh "where he could find the best house in town," meaning, of course, a hostelry or inn where he could put up for the night. The local wag, of whom he happened to inquire, directed him to the private residence of a rather distinguished citizen. Arriving in the yard, he called for someone to care for his horse, entered the house, and, with all the form and assurance imaginable, ordered dinner, and invited the host, whom he found comfortably seated before an open fire, to join him. The host, a man of keen perception, immediately grasped the situation, and, drawing Oliver into conversation, found he had a slight acquaintance with the boy's father, and for amusement kept up the deception. It was not until the following morning, when Goldsmith expressed his satisfaction with the services rendered to him and demanded his bill, that the genial host informed him of his mistake, and he learned that he had been so hospitably entertained in a private home.

This experience proved to be of exceptional value. Later in life he used it as a foundation for that exquisite comedy "She Stoops to Conquer," the popularity of which never seems to wane.

At the age of seventeen, we find he entered Trinity College in Dublin. He entered as a poor student, classed as a Sizar, one who, for his tuition and board, does menial duties, such as waiting on table and sweeping the halls.

At this period Dublin was a gay city. Hospitality and show of splendor developed keen rivalry among the distinguished residents. The masses aped the upper classes, dressing in their second hand clothing and mimicking their behavior and entertainment, as long as the purse would last, at the public inns. Religion was at its lowest ebb. Disregard for the Church and its teaching existed in both extremes of society. No entertainment endured without the bottle. No form of gaiety evolved without preliminary priming to be followed with constant drinking. "Drunkenness and foul talk were thought no discredit." Celebrities appeared in public with their mistresses. "There seemed to be no respect for the marriage vow. For example, Lord Chesterfield, in his letter to his son, instructs him in the art of seduction, as part of a polite education."[5]

Police authority was meager, as evidenced by the mob violence, especially in London and Birmingham. The introduction of gin caused further and renewed interest in drunkenness. "In the streets of London at one time, gin shops invited every passerby to get drunk for a penny, or dead drunk for two pence."[5] "There was no such thing known as a banquet without bloodshed." "Party feeling ran high, and that was an element which the fellowship of one bottle allayed, but the indiscretion of a second inflamed; with the third or fourth per capita came the brawl."[6]

Into this environment came young Oliver Goldsmith, a sensitive, imaginative, and lazy, if not dull, country boy. His college days seem to have been about the most miserable of his life. To what extent the environment affected his sensitive nature or warped his developing character is speculative. He, however, survived this critical period, but not entirely unscathed.

He was not industrious, builded no fences to protect his morals, and gambling became his addiction. He was aimless, irresponsible and generous to a fault, never being able to resist parting with his last shilling if a beggar sought aid. He was frequently flunked, upbraided, and abused; even physically assaulted by his instructors. Although ridiculed by his classmates, disgraced, and degraded, he eventually received his B.A. degree.

The following three years were spent in idleness. However, being arrived at a permissible age, he knocked at the Church and presented himself as a candidate for Holy Orders, but was immediately disqualified and slumped into dreamy inactivity. Ambitionless, he apparently was satisfied to only live. A visit to his Uncle Contairne at Kilmore, for want of anything else to do and having no other place to go, brought him in contact with another guest, the Dean of Cloyne, who for some unknown reason suggested that Goldsmith take up the study of medicine. Immediately his uncle offered to finance him and Oliver offered no objection. "He himself had no idea what profession he was fitted for; but he knew that he was fully qualified by an open mind to spend some interesting years in a strange place at the expense of some one else."

Two years in Edinburgh, and he wrote his uncle: "I have seen all that this country can exhibit in the medical way, and therefore I intend to go to Paris. As I am perfectly acquainted with the French language I shall have much the advantage of most of my countrymen in pursuing my studies." His adroitness in extracting money from his uncle was amazing, his inability to keep it for profitable use was appalling.

His letters from Paris contain free criticism of his lecturers with some reference to medical activities, yet, lengthy discourses with detailed description of the people, customs, and country. He was a penetrating observer and was acquiring a zest for description.

From Paris he went to Leyden, ostensibly to continue his medical course. He reached Leyden "only after as many vicissitudes as would form the groundwork for quite an exciting story encompassing arrests, shipwrecks, and delays."[6] Letters from Leyden exhibit increasing aptitude and a capacity for descriptive ability of general subjects, and less of the special subject of medicine. He was obviously, but unconsciously, be-

coming interested in the profession he would ultimately select as a means of earning a living.

The gains of one night's gambling, and the next night's losses caused him to borrow in the morning. With this money he started on a trip through Europe, but before he had left town he was again penniless through silly sentimental purchases.

For a year he tramped through the Continent without money, friends, or baggage; however, he had taken his flute with him, by the frequent playing of which he was able to collect alms along the way, and thus obtained, irregularly, nights' lodging and enough food to avoid starvation. He returned to England, destitute, dilapidated, and in rags.

Landing in Dover, starvation literally stared him in the face. It was three weeks before he reached London. How he got there or what trials he endured are not recorded. His assets now consisted of a college degree, a certificate entitling him to practice medicine, his flute, and a panoramic memory of his travels, experiences, and people.

Although destitute and hungry, he was fortunate, in a short time, to obtain work at an apothecary's shop. Thus being relieved of anxiety he enjoyed a rest for a few months. While thus employed he ventured to call upon a Dr. Sleigh whom he had known while a student in Edinburgh. Dr. Sleigh showed him much kindness and with his assistance he attempted to enter the general practice of medicine at Bankside, Southwark.

Goldsmith as a practitioner was a failure and whatever the reasons were, enumerated by his biographers, the real analysis is that he was a misfit. It was, however, this very attempt at the practice of medicine which brought him one patient who was employed in a printing office of a Mr. Samuel Richardson of Salisbury Court. This gentleman, seeing that Dr. Goldsmith had some leisure time, made an offer to employ some of his spare hours as reader and corrector to the press of Mr. Richardson. This turn of events marked the beginning of his literary career, for which results the world is grateful.

Without his roving we would have had no "Vicar of Wakefield." Without his vices we might not have had those cherished bits of humor and satire, coupled with the thorough understanding of the deeper human emotions. Without his early ale house associations, when of evenings he occupied the chair at the local pub, we might have missed the ridiculous situations in "She Stoops to Conquer," and have been denied the philosophy served in that delicious dish "The Song of the Jolly Pidgeons."

This song is sung in the play by the character Tony Lumpkins, but I can see no one but Goldsmith himself warbling,

> "Let school masters puzzle their brain
> With grammar, and nonsense, and learning
> Good liquor, I stoutly maintain
> Gives Genius a better discerning."

Again:

> "When Methodist preachers come down
> A preaching that drinking is sinful
> I'll wager the rascal a crown
> They always preach best with a skinful."

Chrisholm states Goldsmith was a parasite of the medical profession. We'll let that stand, but as a writer he has "ever been the best loved of England."

Oliver Wendell Holmes

Oliver Wendell Holmes, a physician, became one of the ever best loved of American writers. It is unnecessary to compare these two physicians as far as their medical achievements are concerned, for it was only through literature that their lives, like the surfaces of two spheres, contacted at a single point. Osler says, "The great distinction of both men lies in that robust humanity which has a smile for the foibles and a tear for the sorrows of their fellow creatures."

Holmes was proud of his ancestry and had reason to be. He was moderately studious. When in prep school he showed literary genius.

After one year at Andover he was prepared for Harvard. At this time there was anchored in the Charlestown Navy Yard, the old frigate "Constitution," and the Government was about to dismantle and wreck her. Holmes' sentiment was so aroused at the thought of such insult to the old historical craft, that in a patriotic, eloquent, outburst, he wrote a stirring poem pleading for her preservation. This poem was published in the Boston Advertiser and from these columns extensively copied. The poem was also

distributed on the streets in the form of hand bills, and so aroused the patriotism of the people that the old sea fighter was preserved. Holmes won immediate fame.[1]

The poem affords a splendid example of his virile literary punch, comparable with the flaming oratory of Patrick Henry.

I quote the last four lines:

> "Nail to the mast her holy flag,
> Set every threadbare sail,
> And give her to the god of storms,
> The lightning and the gale."

Through college he traveled with creditable rank. He frequently wrote verses for the college periodicals. He was chosen class poet, wrote the commencement poem, and was elected to Phi Beta Kappa.

Following his graduation he studied law, all the while contributing anonymous contributions to the "Collegian." Holmes stated that during this year at Law School he was repeatedly tempted to "Pen a stanza, where he should engross."

He did not speak unkindly of his study of law, but thought he liked medicine more, and therefore began his medical studies under the instructions of Dr. James Jackson and his associates. These labors he continued for two and one-half years, then went to Europe for a three years course in Paris and Edinburgh.

He, like Goldsmith, wrote home giving elaborate descriptions of the people, cathedrals, historic structures, and anecdotes connected therewith. The reference in some of these letters to medical subjects appears of postcript importance only.

Holmes was brought up in a religious atmosphere and apparently sufficiently supplied with financial aid, so that he seems never to have suffered hardships. Up to the time he returned to America his travels and studies had taken him over much of the road covered by Goldsmith, but the views they obtained were from different sides of the street, and their haunts and places of amusement, during recreational hours, were undoubtedly more widely separated. Both were keen observers, both had the uncontrollable urge to write, both became engrossed in general subjects outside of their special medical studies. That part of their mental equipment which in the beginning only functioned as or appeared to be "side lights," by some developmental method of nature, became transformed into glaring "head lights" directing the way to enviable achievement and everlasting fame.

S. Weir Mitchell

I shall always be grateful to my father, fate, and fortune for having had the opportunity, while a medical student in Philadelphia, to personally have met and known some gentlemen of the medical profession, whose characteristics and accomplishments are indelibly imprinted in my log book of Memory Lane.

Among them, a memory which I hold most dear, was the privilege of a short, but intimate acquaintance with that distinguished Philadelphia gentleman, physician, and author, S. Weir Mitchell.

With my inadequate pen I have not, from memory alone, attempted to draw a word picture of this celebrated physician, but have taken the liberty to resort freely to his "Life and Letters," so magnificently done into his biography by Anna Robeson Burr. Upon the fore leaf of this work is printed the following lines, "Every human being who is worth it, lives a second life after the first is ended, in the hearts of his friends."[3]

John Kearsly Mitchell, friend and contemporary of Edgar Allen Poe, was a Philadelphia physician whose tremendous interest in life, civic affairs, and literary fields carried his influence far beyond his professional sphere. But more of him at another time. From this stock came the son, S. Weir Mitchell, who early in childhood developed the true book love and "fed his intelligence with books as one would stoke a furnace" and, like his father, soon developed a keen interest in history, politics, and literary discussion.

Ninety years ago, at the age of fifteen, he was admitted to the University of Pennsylvania, which he calls "at this time a small affair with some good men."

He was a student and got on fairly well, evidently amusing himself in an average way, for he writes, "my set were already too much given to billiards and complete idleness, and some took too much stimulus, but I never except once had the least desire to do so. Then I took too much

and the consequence answered as an enduring lesson. Twice I have felt the abrupt effect when, long thirsty, I swallowed a single glass of white wine. On both occasions it affected only my legs and mostly the left; this is true of all poisons, they never act alike on all organs or on all organs alike."

I regret that time does not permit a digression further into his early home life, which was happy and delightful. One glimpse, however, seems permissible. He writes, "I think while I was at college I must have heard all of Akenside, Pope, and much of Dryden read aloud of evenings, when the Scotch whiskey punch was brewed, and songs followed, my father leading in his delightful tenor."

Mitchell early wrote verses. At age seventeen, "To a Polar Star" was published in *The Nassau Monthly*. He had not, however, as yet learned to work; much of his time was given up to day dreaming. His father's illness necessitated decision, and after considerable discussion he decided to be a doctor, much to his father's disgust, who said to him: "You have no appreciation of the life. You are wanting in nearly all the qualities that go to make success in medicine. You have brains enough, but no industry." Young Mitchell persisted, "Well," said his father, "you have chosen, but let us have no changing. You have always been an undecided person." Dr. Mitchell admits his father's comments were true and correct enough, but defends himself in observing that "as I have said, I developed late, morally and mentally."

Mitchell tried surgery, at his father's suggestion, but surgery was horrible to him. He writes, "I fainted so often at operations that I began to despair. Moreover my hands were awkward." These experiences occurred during his apprenticeship in a Dr. Mutter's office. He was nearly four years in the study of his profession and was graduated in 1850. He had now learned to work and, as he expresses it, "I had now power to use my mental machinery." To put the polish on his medical education he went to Europe.

He writes, "Paget was then attracting attention and had just written his Pathology, a thoughtful advance. I dined with him and Quain and Carpenter, at the home of Dr. Jenner." His letters continue to be filled with exceptionally interesting experiences written in his inimitable style.

Remembering his father's wish that he interest himself in surgery, he applied himself to this particular branch of medicine, but soon discovered his unfitness, and, although in his early practice in Philadelphia he had several operations of importance, he came to the conclusion he had neither the nerve nor the hand; deliberately he gave it up and went into general medicine.

He had desired an interneship in the Pennsylvania hospital, but did not receive the appointment owing to prejudice due to differences which had occurred between the elder Mitchell and the Board.

Assisting his father, he progressed with the usual disappointments, reverses, and difficulties that most young physicians encounter. He exhibited interest in collateral sciences and one of his earliest papers was one on, "South American Snake Poisons, Corroval and Vao"; later, "Researches upon the Venoms of the Rattlesnake."

Meanwhile, he writes, "I was cautioned about my scientific researches interfering with my private practice, as it was rather expected that I should amble around in a covered buggy with a negro to hold my horse, to have a good bedside manner and a list of acceptable stories. A little discreet gossip was popular—more popular than sending for a surgeon too promptly."

A division of his autobiography deals with the following subject:

> "The history of a man's life is in what it produces. I have had four forms of product.
>
> First—Toxicology.
>
> Second—I have in my profession made what I may call practical discoveries and inventions.
>
> Third—I have written verse—almost all of it since I was fifty. This has yet to be judged seriously by time.
>
> Fourth—I have at last what always I was sure would come, success as a story teller."

There, in a few lines he has described his accomplishments, as he grouped them, but only detailed studies of each product would lead to an appreciation of his real worth.

In addition to having had the opportunity of seeing him in the hospitals, reading some of his scientific articles as well as fiction, and hearing

him respond to toasts at banquets, I shall always remember one evening when, associated with Dr. John B. Deaver in Philadelphia, I had the exceptional opportunity of being a lone guest at S. Weir Mitchell's home. The occasion was not unusual or exciting for the Mitchell family, but for me, at that age, it was an event more important than the signing of the Declaration of Independence, the Lone Eagle's flight of the ocean, or the launching of the New Deal. The gathering consisted of Dr. and Mrs. Mitchell, his distinguished son, John K. Mitchell, whose charming wife was formerly Miss Williams of Philadelphia, and the young doctor. A delightful, entertaining conversation on various subjects of the day, material and immaterial, took place during dinner, after which in the quietude of his incredible library, I was completely enthralled as I listened for more than an hour to this genius relating, as he only could relate, his experiences, impressions, and almost beatific reactions gained from a recent trip through the Holy Land.

S. Weir Mitchell's correspondence and intimate acquaintance with Oliver Wendell Holmes (who was a great friend of his father's) is scintillating with wit, good humor, friendly criticism, repartee, and science. In lighter vein Holmes, at the end of one letter, signs himself (showing that both men relaxed in foolishness at times), "Make believe I am, Most faithfoolishly yours."

I know of no greater evening's entertainment than the reading of these letters. Correspondence between Oliver Wendell Holmes, Sir William Osler, Dr. J. S. Billings, James Russell Lowell, George Meredith, Phillips Brooks, Woodrow Wilson, James Whitcomb Riley, Dr. Hideyo Nuguchi, and other great men, all of whom were the most intimate friends of this lovable character.

A list of his scientific writings, prose, and poetry would require for consideration an entire volume. Next to Benjamin Franklin he was the most versatile individual in the history of Philadelphia.

He, regardless of his many interests, was always a physician. Holmes, in one of his letters to Mitchell, said, "The world does not take seriously the side careers of men." He, himself, proved to be the paradox and Mitchell was loved for his activities in both medicine and literature if we so limit his careers. He regarded his medical occupation the most important of all and his success therein his chief ambition. If one met him and asked him, as many did, "What are you writing now?" he was more than likely to answer with a twinkle, "Prescriptions." His presence was felt in Philadelphia for three-fourths of a century. Life offered him a zest given to few. Happiness, romance, diverse interests, success in many spheres, sincere personal love of men and women of rare quality, and admired by a host of people he had never met. A rare companionship and professional association existed between Dr. Mitchell and his faithful doctor son, John K. Mitchell, who was ever at his elbow. The strength of their affections increased as age drew on.

"What that tie had become when strengthened by a life of devoted service which hesitated at no personal sacrifice, even to the refusal of one of the most brilliant positions America has to offer a member of the medical profession (its acceptance would have necessitated his leaving Philadelphia and so also leaving his father), cannot be better expressed than by the closing sentence of a letter Dr. Mitchell wrote, just a month before he died. After expressing his complete and abiding confidence in the ability, judgment, and wisdom of his son, both as a man and as a physician, he ends with these words, 'I leave you my love. I have never loved any man as I have loved you. I shall love you still. Wier Mitchell.'"

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OLEOTHORAX*

A Report of Its Use in Twenty Cases

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DURING the treatment of pulmonary tuberculosis by artificial pneumothorax one or more of several complications may arise which are prone to imperil or ruin what otherwise would have been a successful and satisfactory result. Serous effusions, so common in pneumothorax cases, may become purulent and one is faced with that unpleasant complication—tuberculous empyema. Effusions, serous or purulent, almost always lead to pleural thickening and this in time frequently to pleural contracture, an obliterating pleuritis, which results in the pneumothorax space being lost, in the expansion of the lung, and in the return of symptoms, especially if the pneumothorax had been of short duration. A cavity may be so thick walled that air pressure is incapable of closing it or adhesions may prevent a good collapse. A pleuro-pulmonary fistula may develop which, if large, means failure of the collapse; if small, it may heal. A mobile mediastinum may defeat a pneumothorax by its shifting easily, thereby preventing sufficient pressure on the lung. The majority of patients who exhibit one or more of these obstacles to successful pneumothorax therapy are on the road leading to death, chronic invalidism or extrapleural thoracoplasty with the intermediate stations of phrenicectomy or pneumolysis or both. For some of these unfortunate individuals the injection of a neutral oil into the pleural cavity may achieve what pneumothorax could not, that is, a restoration of their health and their ability to provide for themselves and their dependents. In others it may lead to general improvement sufficient to warrant surgical intervention.

In brief then the principal indications agreed to by most experienced men for the production of an oleothorax are:

1. Tuberculous empyema, with or without secondary infection (Disinfection).
2. Progressively contracting pleura (Inhibition).
3. The desirability of a medium more constantly compressing than air (Compression).

Secondary, less frequently employed and more debatable indications for oleothorax are:

1. Small pleuro-pulmonary perforations.
2. Lax or mobile mediastinum.
3. Inability to obtain proper refills or economic necessity of lengthening treatment intervals.

Oleothorax should not be employed when a large bronchopleural fistula exists nor should it be used for serous pleural effusions.

Although small quantities of bland oils had been used in the serous membrane-lined cavities by several men prior to 1922, credit is generally given Bernou for injecting large quantities of oil into the pleural cavity. His first report[4] in 1922 dealt with an instance of pleuro-pulmonary perforation and in this paper the term "oleothorax" is used for the first time. Since then an abundant European literature concerning oleothorax has appeared. At first the reports were most enthuiastic but with time this fervor has been noticeably tempered with some men utterly condemning the measure. Bernou,[4,5] Kuss,[17,18] Fontaine,[11] Sergent,[28] Marie,[21] Morin and Bouessee,[24] Clerc[9] and many others have contributed on the subject. In the United States and Canada oleothorax has been acepted very slowly, as were artificial pneumothorax and the various surgical procedures now commonly used for pulmonary tuberculosis. In fact in 1931 the American Sanatorium Association Committee on the Treatment of Tuberculous Empyema found too few men using oleothorax in this country to form an opinion as to its worth. The first allusion to the intrapleural use of oil in the literature of this continent as it might relate to collapse therapy for pulmonary tuberculosis is a short article on some experimental observations by Archibald[1] in 1922. In using paraffin

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oil on several animals he noted that the pleura was irritated and that the oil tended to be absorbed. He was looking for a substance that would be non-irritating and non-absorbable, and therefore concluded that further effort with paraffin oil was not worthwhile. In 1927 Hayes[13] reported some results in treating tuberculous empyema. In the past four years reports by Sillig and Lang,[20] Matson,[22,23] Hayes,[14] Bethune,[6] Carmichael,[7] Davis,[10] Pollock and Skinner,[25] Ross,[26] MacMahon,[20] Ballon,[3] Bacon,[2] Josewich,[16] and McCarthy[19] have appeared. Matson's report in 1932,[23] based on his experience with one hundred cases, is the most detailed and comprehensive. He has been the most outstanding proponent of oleothorax in the United States and a very sane one.

Three oils have been used for oleothorax. Bernou began with gomenolized olive oil. Gomenol is a volatile, aromatic oil, colorless to slightly yellow, and is produced by distillation of the leaves of Melaleuca Viridi-flora, a member of the myrtle tree family found in Gomen, New Caledonia. It has been found non-toxic for animals and is presumably so for man though Matson raises a pertinent question in this regard, having had three cases of acute toxic nephritis for which gomenol may have been responsible. Later paraffin oil with gomenol was used, as the mixture is absorbed more slowly. Cottonseed oil (Wesson) is advocated by Bethune, as it is cheap, pure, bland and neutral. Many men are now using paraffin oil without gomenol or other similar substances. Gomenol has been used particularly in empyema cases with the thought that it was bacteriocidal or inhibitory to the growth of the tubercle bacillus. One finds conflicting views in this regard. Clerc[9] for instance concluded it has a marked inhibitory effect on the growth of the acid-fast bacilli and less so with the staphylococcus. Chandler and Gloyne[8] feel gomenol has no bacteriocidal qualities against tubercle bacillus. Josewich has discarded gomenol altogether, using cajeput oil in a new colloid preparation which he claims is superior to other oils, being less irritant and less toxic, and, being less viscid, goes through a small needle.

The effective action of a noncompressible substance like oil in blocking an obliterative pleuritis is readily appreciated. Likewise the comparatively constant compressing effect of oil on cavities, for instance, in contrast to air, whose pressure intrapleurally varies a great deal between refills, is also understandable. Not clearly understood, however, is the curative effect of oleothorax upon tuberculous empyema. Bernou thinks that, aside from any antiseptic action of gomenolized paraffin or olive oil, some proteolytic activity must play a part. Sergent and Turpin feel that the irritative effect on the pleura is the dominant factor. There are also reasons for assuming a lipolytic ferment action with perhaps direct action of lipases upon the waxy capsule of the tubercle bacillus. At any rate it is obvious that the true action of oleothorax on tuberculous empyema is obscure.

Experimental oleothorax has revealed some interesting findings. Goldenberg and Flanchik[12] concluded from their work with rabbits that both olive oil and paraffin oil produce an inflammatory reaction in the pleural cavity and that this is more marked with olive oil, which also is absorbed more rapidly. Furthermore they noted that olive oil undergoes marked physico-chemical changes in a short time whereas paraffin oil does so only after a prolonged interval. Paraffin oil, they believe, is preferable to olive oil for oleothorax. Saley, Willis and Ellwart[27] using paraffin and cottonseed oil alone, or with 1 to 5 per cent gomenol, found adhesion formation constantly present. Paraffin oil was not absorbed while cottonseed oil tended to be absorbed some weeks after injection and with this adhesions became fewer. They likewise attempted ascertaining if the oil migrated from the pleural cavity. Tieman's soluble blue was added to the oil for this purpose but in one animal only was the dye found to have migrated and in this one instance to the retromanubrial nodes. "Amfetin" (E. Lilly) was added to oil to note whether adhesion formation could be prevented but the only result observed was an apparent diminution in the amount of oil found.

The technic of establishing an oleothorax is not difficult. Some men have devised more or less complicated equipment consisting of bottles, tubing, four-way stopcocks, etc. Aside from the small syringe and needles necessary for anesthetizing the chest wall, I have found that a 20 c.c. and a 50 c.c. syringe with a two-way stop-

cock and several needles ranging from 18 to 10 gauge are quite adequate. When a tuberculous empyema is being treated, as much fluid as possible should be first aspirated, the pleural cavity washed out with normal saline and for the first injection not more than 10 c.c. of gomenolized (2 to 5 per cent) paraffin oil injected into the pleural cavity. It has been my practice to repeat this order of procedure at weekly intervals, increasing the amount of oil each time until the pleural space is nearly filled. Until fluid formation has stopped, a pocket of air should be left to act as a cushion against increasing pressure produced by effusion. In using oleothorax for inhibition and compression purposes I have been using plain paraffin oil. Here one must be still more careful in beginning to replace air with oil in order to obviate local and general reactions, which can be very severe. An initial injection of 2 c.c. of oil, doubling the amount with each subsequent treatment, is a safe rule, but despite this care very occasionally reactions will occur. The time interval between oil injections for these indications must be judged with each case.

Of utmost importance during the conversion of a pneumothorax to an oleothorax is close attention to intrapleural pressure. With each syringeful of oil injected a like amount of air should be withdrawn. As long as air is present the pressure can be readily obtained with a water manometer but with the pleural cavity filled with oil, accurate estimation of the pressure is difficult. Oil manometers have been devised but are not satisfactory. A simple and safe method is to observe whether oil returns through the needle and to stop injecting as soon as it does. By following this method I have had no difficulties which could be attributed to high intrapleural pressure.

The dangers one might encounter in producing an oleothorax are rupture of the lung and pleuro-cutaneous fistula. Both are caused as a rule by high intrapleural pressure. Oil embolism has also been reported. None of my patients has developed lung perforation nor have I encountered oil embolism. The one unsuccessful empyema case in my present group was complicated by multiple chest wall fistulæ before oleothorax was begun.

The complications which may arise during this type of therapy are febrile episodes of varying intensity, chest pain of different degrees and the formation of fluid under the oil which may be either serous or purulent. Paraffinomas also may occur. Two patients reported in this series had febrile and local reactions, one so severe and repeated that oil injections had to be discontinued. In two patients serous fluid formed under the oil but subsided after several aspirations. In one instance a purulent effusion formed under the oil and upon aspiration of all fluid and oil this situation was controlled. Paraffinomas have been conspicuous by their absence in my experience.

In addition to these dangers and complications one encounters the additional disadvantage of pleural thickening, especially if oil has been in the pleural cavity for several months. This pleural hyperplasia renders roentgenological examination of the parenchymatous lesion more difficult and, if marked, valueless. Furthermore it is quite probable in certain instances the pleural thickening may become so pronounced that expansion of the lung will be prevented and thoracoplasty eventually indicated.

The duration of an oleothorax is variable as it is in pneumothorax cases. Probably a good average is five years. Some workers in treating empyemas favor aspirating the oil as soon as the effusion stops and re-establishing pneumothorax. Others maintain the oleothorax for the required period of collapse, which seems to me the procedure of choice because of the marked tendency toward a contracting pleura following empyema.

My personal experience with oleothorax is limited to twenty cases. This series includes seven instances of tuberculous empyema for which 2 per cent gomenol in paraffin oil was used. Six of these were uncomplicated at the onset by a secondary infection and of these, five were controlled. In the one fatal case multiple pleural cutaneous fistulæ had developed before oleothorax was begun and overwhelming secondary infection followed. The treatment of the patient with tuberculous empyema with secondary infection of hemolytic staphylococcus and staphylococcus aureus was a brilliant success. Eight of the twenty cases were treated with paraffin oil alone because of a contracting pleura which threatened to induce premature expansion

of the lung. Of these eight, six were successful. One of the failures in this group was due to marked and repeated febrile and painful reactions from the injection of 1 to 2 c.c. of oil, necessitating discontinuance of the injections. The other failure is waiting for thoracoplasty. Five cases were for compression purposes where pneumothorax or pneumothorax and phrenicectomy combined had failed. In this group there were three successes and two failures.

RESULTS OF 20 OLEOTHORAX CASES

Indications	Total Number	Number Successful	Number Unsuccessful	Per cent Successful
Tuberculous Empyema	7	6	1	85
Contracting Pleura	8	6	2	75
Compression	5	3	2	60

I am well aware of the fallacy of attempting to prove the virtue of any therapeutic measure by a small series of cases but the consistent manner in which these results agree with other larger series is at least significant. My percentage of successful results with tuberculous empyema is unusually high, the average in the literature being between 50 and 60 per cent, but I presume as my cases grow in number this will automatically adjust itself. With this thought in mind it must be conceded that repeated aspirations alone have controlled many tuberculous empyemas. It is my distinct impression, however, that oleothorax not only produces a higher percentage of successful results but achieves this goal in a much shorter time.

Discussion

I am convinced from a study of the literature and my personal experience that oleothorax deserves a recognized but limited place in the field of collapse therapy for lung tuberculosis. It distinctly is not a type of treatment to be used by the inexperienced but rather is one which requires most careful selection of cases, meticulous attention to details while it is being instituted, and close follow-up care. There is much to be learned regarding the eventual results of introducing a foreign substance, even though it be bland and neutral, into any of the serous cavities of the body. Further experimental study is highly desirable as the only substantial fact so far elucidated, aside from the absorbability of the various oils, is that these oils produce pleural inflammation with subsequent thickening and adhesion formation. It would be well to know what happens to the oil that is apparently absorbed. What is the effect, if any, on liver, spleen and kidney from prolonged retention in the body of substances like gomenol and cajeput oil? Why does oleothorax clear up a tuberculous empyema in one case and produce a purulent effusion in another? What is the exact action of oil in controlling any empyema—a truly disinfecting one because of the added substances like gomenol or is there some obscure physicochemical action rendering the pleural cavity and its contents a poor culture medium?

Despite our deficient knowledge along these lines, for the moment I am satisfied certain persons have been restored to health and a working capacity by oleothorax. Their time of residence in the hospital has been shortened and they have escaped major surgical interference.

Conclusions

1. Experience with oleothorax in twenty cases of pulmonary tuberculosis is reported.
2. Six of seven patients with tuberculous empyema were controlled. Six of eight cases of contracting pleura were successfully blocked. Three of five instances needing constant compression responded well.
3. Pleural-pulmonary perforation, lax mediastinum and pneumothorax replacement do not occur in this series.
4. Despite obvious deficient knowledge concerning oleothorax, the procedure has a definite though limited field in the treatment of tuberculosis of the lungs and should be used only by those having a large pneumothorax experience.

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THE SAFENESS OF ARTIFICIAL PNEUMOTHORAX AS THERAPEUTIC TREATMENT IN PULMONARY TUBERCULOSIS

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THAT hazards and even dangers attended the administering of artificial pneumothorax in the days when the treatment was first used effectively is an accepted fact; but it is also true that in most sanatoria and clinics today there are comparatively fewer and relatively less serious complications resulting from artificial pneumothorax treatment. This can be proven by the following analysis of clinical reports.

The Glen Lake Sanatorium, since 1927, has maintained a clinic which is held regularly every Thursday morning at the Out-Patient Department of the University of Minnesota. Two physicians, members of the staffs of both the University of Minnesota Department of Medicine and the Out-Patient Staff of Glen Lake Sanatorium are in attendance. Refills only are administered here as all patients discharged from Glen Lake Sanatorium have had their treatments instituted at the Sanatorium.

From November 1, 1927, to October 1, 1934, treatments were given to 110 ex-patients from the Sanatorium. The number of visits approximated 4,019. On October 1, 1934, 56 patients were receiving refills regularly through this department. The 110 patients received 3,847 actual refills over this period, for in 231 instances air was not given either because it was unnecessary or because complications made it impossible, while 59 were bilateral refills.

It is noteworthy that out of 110 cases receiving 3,847 refills, only five individuals had reactions. Two of these patients experienced reactions at two different times, making a total of

seven reactions. One patient felt weak and dizzy shortly after receiving air and did not feel well for several days afterwards. Another patient ran a temperature of 103 degrees and felt very uncomfortable for three or four days after receiving a refill. The temperature, which gradually abated, was experienced again in a smaller degree after the next refill. Soon after this she developed fluid in the pleural cavity. Another patient reported considerable pain after a refill, but this, too, gradually disappeared. Some months later this same patient felt weak and nauseated for a short time. In another case considerable pain over the precordium was felt for some time after receiving pneumothorax. One woman had a fainting sensation immediately after receiving bilateral pneumothorax. However, since her pulse was normal and no chest pain was experienced, the reaction was believed to be entirely hysterical.

It is very possible that the above cases do not represent all the reactions experienced by the patients. Although the patients are encouraged to report any slight discomfort experienced after treatment, unreported reactions may occur when the patient is away from the clinic. However, it is believed that almost all reactions were reported.

Five accidents in four individuals were recorded in administering the 3,847 refills. In one case a subcutaneous arteriole was severed and bled, resulting in a hematoma under the skin in the axillary region. The chest was bandaged tightly with a cotton pad over the hematoma. The patient's condition was normal. About a month later the same complication recurred, but it was treated as before, and the patient's condition remained normal.

In another case fluoroscopic examination after the administering of air did not show a pneumothorax. Apparently the parenchyma of the lung had been punctured. The patient expectorated about one ounce of blood and no further attempt to inject air into the pleural cavity was made that day. The patient did not seem to suffer any after-effects.

Appearances are often deceiving and a minor pneumothorax accident may sometimes look like a major catastrophe to the patient. For instance, in another case the needle evidently struck an adhesion and blood vessel, and the patient expectorated blood. Upon the occasion of another refill about six months later, the needle drew blood, and after the needle was withdrawn the patient coughed up some blood. But no ill effects were suffered by the patient on either occasion.

In the final case the patient raised blood-streaked sputum after receiving a refill. This condition soon ceased, however.

It can readily be seen that these accidents were of a minor character and the percentage was almost negligible. This fortunate fact gives evidence of the comparative safety of administering artificial pneumothorax treatments.

Only those patients reporting for a period of three months or more are considered in a more detailed report of the cases attending the clinic. No conclusive data can be drawn from an observation period of less than three months.

From November 1, 1927, to October 1, 1934, a total of twenty-four individuals reported for artificial pneumothorax treatments for a period of less than three months. The records show one patient reporting for less than three months in whom pneumothorax treatments had to be discontinued because of adhesions. Treatment was dropped six years ago and the patient is in good health at the present time.

Table I shows the disposition of these twenty-four cases and also includes the group reporting for a period of three months or more. Of the nine cases readmitted, six had originally been discharged from the Sanatorium as only "improved" cases; two of these had deserted, two left against advice, another was transferred to the General Hospital for special treatment, and the sixth was transferred because of insanity. Of the other three patients, two were discharged as arrested, recommended, and the third was a quiescent case to whose discharge the medical staff acquiesced. When one of the arrested cases started working soon after discharge, symptoms reappeared. Even when the work was lightened, coughing and raising persisted, although to a smaller degree. A little later the patient began to raise blood-streaked sputum and to suffer from dyspnea, notwithstanding the fact that the x-ray showed no change except a slight re-expansion of the collapsed lung. But, because of the symptoms, it was considered advisable to re-

admit him. He improved immediately with bed rest. An x-ray taken some time after discharge of the other arrested case showed a possible spread of the disease in the other lung. The patient discharged as quiescent developed a new lesion in the apex of the uncollapsed lung.

TABLE I. DISPOSITION OF CASES REPORTING FOR REFILLS

November 1, 1927, to October 1, 1934

Disposition of Cases	Reporting less than 3 months	Reporting for more than 3 mo.	Total
Current	5	51	56
Readmitted	9	10	19
Discontinued	1	3	4
Priv. Phys.	5	15	20
Moved	4	4	8
Dead	0	3	3
Total	24	86	110

The above 24 patients made 121 visits to the pneumothorax clinic, receiving a total of 125 actual refills. This leaves a total of 3,733 actual refills for the remaining 86 individuals to be studied. In the remaining part of the paper reference is made only to the 86 patients who reported for a period of more than three months.

Of these 86 patients who reported for three months or more to our pneumothorax clinic from November 1, 1927, to October 1, 1934, 51 were current cases at the end of the period of study. In addition to the 10 patients shown as having been readmitted, 7 other patients have been readmitted and discharged. Four of them are included in the 51 current cases, one is now going to a private physician, one has left the city, and one is deceased. The average period of treatment from the Out-Patient Department for the whole group was 19.1 months.

The group of 86 was composed of 47 females and 39 males. The female cases ranged in age from 20 to 59 years, with an average of 33.0 years, while the male age range was 17 to 57, with an average of 31.8 years. Combining the male and female groups, the average age was 32.5 years.

It is interesting to note the refill intervals of the patients. In 43 of the 86 cases there were no changes in intervals over the period of observation, while 43 cases showed a lengthening of intervals which varied from one to four weeks. In no case was there a shortening of the interval.

Fifty cases showed no apparent change in the size of collapse, while 24 showed an increase in collapse and 12 showed a decrease in the amount of collapse. Among the 12 cases which showed a decrease in the amount of collapse we find 3 patients who were readmitted, 2 with whom treatment was discontinued because of inability to enter the pleural cavity, and in another case the patient who had left town for several months (during which time refills had not been given) had almost lost his collapse on return to the clinic.

There were 7 cases which showed possible or definite spread in the uncollapsed lung. Five of these patients were readmitted to the Sanatorium, while the other two took bed rest at home.

A study of fluid, adhesions, and hernia discloses that 38 patients, or 44.2 per cent of the 86 cases, had fluid which appeared at some time during the period of observation. In only one case, however, did the fluid contain pus.

In 67 persons, or 77.9 per cent of the cases, adhesions were recorded, only 2 of which interfered seriously with the collapse treatment. These figures are given in Table II. A mediastinal hernia was found in two cases, while in nine, or 10.5 per cent of the cases, no complication of any kind was recorded.

TABLE II. FLUID, ADHESIONS, AND HERNIA FOUND IN 86 CASES UNDER OBSERVATION

	Number	Per Cent
Fluid	38	44.2
Adhesions	67	77.9
Hernia	2	2.3

Aside from the 17 patients readmitted to the Sanatorium for further care, there were 5 in whom pneumothorax treatments were not so satisfactory as they might have been. Two of these five patients had a spread in the uncollapsed lung, and, although not readmitted to the Sanatorium, were on bed rest at home. Two other patients were forced to discontinue pneumothorax treatments because of inability to enter

the pleural cavity. One of these two patient had been receiving pneumothorax refills for a considerable time so that the re-expansion of the collapsed lung has not had any ill effects as yet. The prognosis in the other discontinued case is uncertain at this time. The fifth patient died very suddenly of pulmonary tuberculosis. His pneumothorax collapse, however, was satisfactory to the end.

A study of the above 22 patients in whom the treatment was not entirely successful shows that only 8 of them were discharged from the Sanatorium as arrested cases, while 3 were quiescent, 9 improved, and 2 unimproved. Also 4 of the discharges were given permission to leave, 3 deserted the Sanatorium, and 5 left against advice. Of the 8 arrested cases, 3 showed a spread in the uncollapsed lung. One, a bilateral case, developed influenza, which was followed by the reappearance of tuberculosis symptoms together with considerable fluid. Fluid also appeared in another case, and the patient showed a marked loss of weight. And in another, fluid appeared and symptoms became manifest again, no doubt due to the careless mode of living. The seventh patient was readmitted because of a hemorrhage which occurred 10 days after her refill; however, the patient stated that she had been in a general run-down condition for some months previous to this occurrence. The eighth case was that of the patient who died very suddenly of pulmonary tuberculosis.

In the remaining 14 cases of the 22 cases which were not arrested we find adhesions causing the discontinuation of refills in 2 patients, spread in the opposite lung in 4 instances, 1 patient who had been discharged only for the summer and was readmitted in the fall, 1 readmitted for only a short time because of pneumonia, and 2 patients in whom fluid appeared and in whom symptoms reappeared, 1 patient readmitted because of pregnancy, 1 because collapse had never closed the cavity, 1 readmitted because of streaking, and the last one was readmitted to finish working up on exercise.

There remain the second and third patients tabulated as being dead, and the one in whom pneumothorax was discontinued. One of the two deceased patients committed suicide, while the other died of non-tuberculous pneumonia. The patient who discontinued pneumothorax six years ago did so against the physician's advice and is now applying for readmission to the Sanatorium.

Although it is impossible to say what the ultimate outcome of these cases will be, I believe that their histories point to the comparative safety in the administering of refills and to the ever-increasing use of artificial pneumothorax treatment in pulmonary tuberculosis. This statement is based upon the conclusive study of the 110 cases receiving 3,847 refills over a period of 83 months. Only 5 individuals had 7 reactions, and only 5 accidents, very minor in character, were experienced.

CHRONIC ULCERATIVE COLITIS AMONG ELDERLY PERSONS

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THE presence or absence of disease of the large intestine can almost always be determined from anamnesis and a careful physical examination. The differential diagnosis of chronic ulcerative colitis and other diseases of the intestine, however, is more difficult and requires methods of precision. Such symptoms as rectal bleeding, abdominal pain, diarrhea, and constipation will in most instances direct attention to the large intestine; however, gross and microscopic examination of the stool, sigmoidoscopy, and frequently roentgenologic visualization of the colon after barium enema, will be essential for correct differential diagnosis.

To emphasize these statements, we would cite cases in which obstructive carcinoma of the rectum produced diarrhea, constipation accompanied amebic infestation of the colon, or severe, chronic

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ulcerative colitis seemed to produce very few and slight symptoms. Within the past year we were afforded an opportunity of examining four individuals more than sixty years of age who were found to be suffering from chronic ulcerative colitis. We were impressed with the mildness of the subjective complaint when we later observed the extent of the pathologic changes that had taken place in the colon. Chronic ulcerative colitis as a rule produces a very definite train of symptoms, which includes bloody diarrhea of great severity, tenesmus, abdominal cramps, loss of weight, and anemia.

It was this disparity between the disease as it usually is encountered among young adults and as it was noted in the cases of these four elderly persons that prompted us to review the records of all patients at The Mayo Clinic, from 1924 to 1932, inclusive, who were more than sixty years of age and who were found to be suffering from chronic ulcerative colitis. In this period of nine years a diagnosis of chronic ulcerative colitis was established in a total of 1,291 cases. Only twenty-five of the patients were more than sixty years of age, or 1.9 per cent of the total. Chronic ulcerative colitis was seen most frequently among patients between the second and fourth decades of life.

Of these twenty-five elderly patients, sixteen were males and nine females. Four were more than seventy years of age, and the remaining twenty-one were between sixty and seventy years of age. All twenty-five patients had been seen by their family physician prior to their coming to the clinic, and the existence of a malignant condition of the large bowel had been suspected. Curiously enough, most of the patients themselves feared that carcinoma was developing. To illustrate the deceptive character of the symptoms it should be stated that, after the history had been obtained and physical examination made, a diagnosis of colonic carcinoma was thought to be most likely; use of the sigmoidoscope was required to prove the presence of chronic ulcerative colitis. The reason for this error in judgment is obvious. Any person more than sixty years of age who presents a story of change in intestinal habits associated with rectal bleeding and with vague abdominal distress, is immediately suspected of harboring a neoplasm within the large intestine.

The symptoms of these elderly patients were not as a rule characteristic of chronic ulcerative colitis. A rather mild diarrhea was mentioned, and bleeding, although fairly constant, was usually not profuse. The debilitating tenesmus, loss of weight, anorexia, and intractable, bloody, purulent rectal discharges were seen in only four of the twenty-five cases. In fact it seems safe to assert that were it not for a perfectly natural dread of carcinoma, many of these older persons might easily have avoided seeing any physician. Periodicity in the diarrhea, the mildness of this symptom, the relative absence of abdominal cramps, slight if any loss of weight, and in four instances actual constipation, all militated against any suspicion of chronic ulcerative colitis. Even in cases in which the patient complained of constipation, bloody rectal discharges occurred.

The duration of these symptoms was variable, being from two weeks to three years. Following sigmoidoscopic examination, however, a careful probing into the past history was invariably attempted, and in most cases revealed that a certain amount of diarrhea of a periodic type had existed in a mild form for many years. One man stated that he had had slight diarrhea lasting for a day about every two months, but that constipation was his usual trouble. Rarely had previous attacks of diarrhea been persistent in such cases, although six of the patients had suffered from them off and on for more than eight years. Even in these cases, however, debility, wasting, and anemia were not found on physical examination. In fact, for the most part, despite the nature of the disease and the ages of the patients, their general condition was surprisingly good. Only five presented evidence of marked anemia. All were ambulatory and only two exhibited febrile reactions.

In distinct contrast to these rather inconstant and indefinite symptoms were the findings revealed by the sigmoidoscope. By this means of examination a very clear cut and unmistakable picture was observed in all cases. The characteristic red, granular mucosa, which bled easily when touched with a cotton swab, was present. The ulcerative process was an active one in nearly all cases, and to all intents and purposes the picture was usually one that has been described as typical of active, chronic ulcerative colitis. Contraction of the rectal and sigmoidal lumen was rather marked in nine of the cases, was slight in seven, and in nine cases there was

no evident contraction. Curiously, the very common complication of polyps was not seen in any of the cases. Carcinoma, which is a complication in about 2.5 per cent of cases of chronic ulcerative colitis, was observed in one case. As has been noted in previous reports, this superimposition of malignant growth on an ulcerated colon is not common; when it does occur, it usually does so among young adults, and the malignancy almost invariably is of high grade. We must conclude that when chronic ulcerative colitis occurs among elderly patients, it exhibits no more marked neoplastic trend than it does among younger patients.

Roentgenologic studies of the colon, using the barium enema, were diagnostic for chronic ulcerative colitis in seventeen of the twenty-five cases. In eight cases there was no roentgenologic evidence of pathologic change above the sigmoid, which is an unusually high percentage. In seven cases the disease appeared roentgenologically to be confined to the descending or sigmoid colon. It is thus apparent that in fifteen of the twenty-five cases the disease was localized in either the rectum, the sigmoid, or in the descending colon. In the remaining ten cases, chronic ulcerative colitis involved the entire colon. This tendency of the disease in older patients to be rather limited in its extent may aid in explaining the relative mildness of the symptoms.

On the establishment of the diagnosis, immediate and energetic treatment was begun along the lines previously described by Bargen. This consists of: (1) immunization, vaccination, or desensitization against the offending diplo-streptococcus; (2) removal, if practicable, of all distant foci of infection; and, (3) institution of proper feeding. This treatment, combined with general supportive measures, resulted in a rather remarkable series of responses among these elderly persons. In the early years of this form of treatment it was felt that older persons would not be much aided by any measures. Gradually our ideas along these lines have changed, and we now feel, in the light of our observations, that a fairly happy prognosis may be offered. Care must be exercised in administering the specific antibody solution or the vaccine, as severe reactions seem to be more common among these older patients.

The immediate response of these patients was frequently rather dramatic. Twenty of the twenty-five were improved greatly within two weeks from the beginning of treatment and were sent home, where administration of vaccine was continued by the family physician. Of the remainder three responded slowly but left for home within four weeks definitely improved; and two responded poorly and went home little improved.

Further data were obtained in twenty-two of the twenty-five cases. One patient had died three months later of carcinoma of the colon. One had died of a stroke two years after dismissal; she had not had any intestinal symptoms for a year prior to her cerebral accident. Of the twenty patients known to be living, thirteen were entirely free of symptoms after an elapsed period of at least two years. Two had had mild exacerbations and had returned to the clinic for further observation and treatment. Improvement was immediate. Three wrote that they were still having some mild diarrhea but were feeling well. Two were not improved, despite fairly rigorous treatment with vaccine at their homes. As might be expected, patients with involvement of the distal segments of the colon did better than those whose entire colon was diseased.

Comment

Chronic ulcerative colitis among patients more than sixty years of age, although rare, does exist and, when seen, the symptoms are usually deceptively mild. Careful investigation of the entire colon must be undertaken as coexisting carcinoma may be present. Sigmoidoscopy is the diagnostic agent "par excellence."

Treatment along specific lines must be begun at once, since the response is gratifying and dangers are minimal. A splendid eventual outcome, although not invariable, is usually attained among older patients suffering from chronic ulcerative colitis if proper treatment is instituted.

THE MODES OF ONSET OF SYMPTOMS OF CARCINOMA OF THE STOMACH*

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A THIRD of the carcinomas of men and a fifth of the carcinomas of women occur in the stomach, and it is estimated that 38,000 persons die each year in the United States from carcinoma of that portion of the body. Of the patients with carcinoma of the stomach who come to the clinic, 50 per cent have clearly inoperable lesions, and of the remaining 50 per cent who are operated on only half (25 per cent of the total) have resectable lesions. These facts emphasize the importance of this disease.

It is constantly being said that there are two ways in which this high mortality may be reduced: first, by earlier diagnosis, and, second by earlier surgical eradication of the growth. Apparently the immediate future holds no other means of probable success.

Since, at present, early diagnosis holds the key to the partial solution of this problem, it has been thought worth-while to emphasize some of the ways in which carcinoma of the stomach may begin. If one is on the lookout for the disease and is familiar with its early symptoms, one is more likely to insist on roentgenologic examination of the stomach, for the expert roentgenologist is able to detect most of these lesions at a stage when they are still resectable. If any hope lies in surgical intervention, it is early in the disease; in fact, at times before an accurate clinical diagnosis can be made, for by the time definite diagnosis can be made it is often too late to resect the lesion.

The mode of onset of symptoms of carcinoma of the stomach depends in large part on the pathologic type and situation of the lesion and, to some extent, on the reactivity of the individual (whether he is hypersensitive or hyposensitive). Lesions which exist near the pylorus will more likely lead to obstruction, whereas those high in the fundus of the stomach will more often produce anemia, loss of weight and strength, and vague dyspepsia.

There is no recognizable type of person more likely to have carcinoma of the stomach than another. The disease occurs often among persons with a normal constitution and those apparently in perfect health and with good digestion. Occasionally, a patient with the disease gives a history that many members of the family have died of carcinoma, but the reverse is true also, and little diagnostic reliance should be placed on these facts. It should be recalled that age is no barrier to this disease. In fact, in one of nine cases of carcinoma of the stomach the patient is less than forty-five years of age and, up to 1930, at the clinic, in 250 cases of carcinoma of the stomach patients were less than forty years of age.

Typical History

Associated with the most common mode of onset of the disease is the so-called typical history. Unfortunately, this is only too commonly emphasized as the usual history of the disease. I say "unfortunately" because so often, when the symptoms are clear cut, the disease already is hopelessly advanced. The characteristics of this typical history are as follows: the patient, usually middle-aged, gives a history of perfect digestion until the gradual or rapid onset of dyspepsia, which is characterized by anorexia, fullness and discomfort after meals, belching, burning, nausea and, occasionally, by vomiting with loss of weight and strength. The story usually is of a progressive condition, and not infrequently the patient is emaciated and palpates an abdominal mass before consulting his physician.

I should like to call attention to the frequency with which symptoms begin following an apparently acute infection with loss of weight; "flu," or "intestinal flu" as the patient often describes it. The factors responsible for this sequence are not quite clear.

The significant points to recall are the previous history of good digestion, especially if the patient is middle-aged, with onset for the first time of progressive continuous dyspepsia which may have produced a decline in general well-being.

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Ulcer Type History

Carcinoma of the stomach not infrequently begins with symptoms like those of peptic ulcer. The history may be of long or short duration. It should be pointed out that this does not mean that the carcinoma developed in an ulcer, but the occurrence of symptoms suggesting ulcer may mislead one from the correct diagnosis. According to Eusterman and Kirklin, about a fourth of resectable carcinomas of the stomach simulate peptic ulcer, especially at the outset. When a patient past middle age presents a short history of ulcer type, one should be on the lookout for carcinoma. Similarly, suspicion should be aroused if there is loss of weight and strength out of proportion to reduction in intake of food.

When the history of ulcer type is long, one should suspect the development of a complication, of associated disease, or of carcinoma, if there occur (1) disappearance of intermittency of exacerbation of symptoms with substitution of a continuous or remittent clinical course, (2) irregularity, diminution, or disappearance of pain-food-ease sequence, (3) substitution of usual distress by a dull ache, more or less continuous, and aggravation rather than ease by alimentation, and (4) nausea and anorexia. In addition, if carcinoma of the stomach is present, the following objective phenomena may be found: (1) lowered gastric acidity, (2) anemia without gross bleeding, (3) occult blood in the gastric contents, and (4) disturbances in motor function of the stomach (Eusterman).

The following cases illustrate the onset of carcinoma of the stomach with symptoms of ulcer of short and of long duration.

Case 1 (short history).—A man, aged sixty-four years, came to the clinic in December, 1933, with a history of good digestion until six weeks previously. At that time a dull burning sensation had developed in the midepigastric region two or three hours after meals, with prompt ease after ingestion of food. Pain had not been present, although the patient had been awakened at night with the distress. His appetite had been good; he had lost 10 to 15 pounds (4.5 to 6.8 kg.). These symptoms had persisted. Physical examination gave essentially negative results except for a questionable mass high in the epigastrium on the left. Laboratory studies revealed a normal hemoglobin content of the blood and achlorhydria with fresh blood in the gastric content. Roentgenologic study revealed carcinoma in the middle third of the stomach. The growth was resected at operation.

The only clinical features in this case suggesting carcinoma of the stomach were the age of the patient, and a relatively short history of dyspepsia following previously good, digestive health.

Case 2 (long history).—A woman, aged forty-two years, came to the clinic March 28, 1934, because of stomach trouble of fifteen years' duration. In the early course of the disease she had had pain high in the epigastrium which had been projected through to the back; this pain had occurred irregularly and usually had been relieved by food. Four years before registration an ulcer type of distress had developed with discomfort two to three hours after meals; this had usually occurred in the spring and autumn, and had been relieved by food and soda. Roentgenologic study at that time had revealed a duodenal ulcer. Three months before admission the pain had become more severe, and with it bloating and epigastric fullness had occurred. There was no loss of weight. On physical examination the patient appeared to be healthy. The concentration of hemoglobin was 86 per cent. Analysis of gastric contents revealed a free hydrochloric acid value of 30 and total acidity of 44. Roentgenologic study disclosed a shallow, ulcerating lesion on the posterior wall of the stomach, near the greater curvature above the angle. At operation, the ulcerating lesion proved to be an adenocarcinoma of grade 4; there was marked glandular involvement.

In this case the finding of the carcinoma at operation was a surprise. The situation of the lesion near the greater curvature on roentgenologic examination, suggested the possibility that it might be malignant, but the sex and age of the patient, the long history of ulcer, and the absence of loss of weight or strength and of anemia suggested a benign lesion.

There has been much discussion as to the probability of carcinoma developing in a gastric ulcer. Without entering into this controversy, it should be made plain that the significant fact is that not infrequently the physician and the roentgenologist are unable to say whether an ulcerating lesion in the stomach is benign or malignant, and occasionally even the surgeon will be misled after gross inspection of the lesion.

Obstruction

Carcinoma of the scirrhous or polypoid type occurring near the pylorus may produce pyloric obstruction early or late in the course of the disease. When symptoms of obstruction arise early, and especially when they are associated with a previous history of ulcer, diagnosis may be dif-

ficult if not impossible. One may have to be content with the diagnosis of obstructing lesion at the outlet of the stomach. As Eusterman has pointed out, gastric retention may occur in cases of carcinoma of the stomach without a lesion at the pylorus, and one should think of this diagnosis when there is a residuum in the fasting stomach if barium is not retained after six hours. In addition, he has pointed out that in 60 per cent of cases in which the lesion is resectable and in 40 per cent of cases in which the lesion is small, gastric retention is present.

The following case illustrates this obstructive type of lesion:

Case 3.—A man, aged sixty years, registered at the clinic in December, 1933, because of dyspepsia and weakness. He had been unusually well until three years previously, at which time vague dyspepsia had developed and a diagnosis of duodenal ulcer had been made following roentgenologic study. By following a dietary and medical schedule he had obtained relief of symptoms until a year later, when epigastric pain intermittently in the afternoon and at night had occurred; this had been relieved with food and soda. One month prior to admission the patient had become nauseated in the mornings, and he had vomited food eaten the previous night. This had continued, and he had lost strength, had become fatigued, and was content to sit around all day. He had lost only 8 pounds (3.6 kg.). Physical examination gave essentially negative results except for indicating Paget's disease of the bones. Laboratory studies gave evidence of secondary anemia, the value of hemoglobin being 9.6 gm. per 100 c.c. of blood; after an Ewald meal, free hydrochloric acid was found to be 14, total acidity 24, and the gastric content obtained by aspiration, 500 c.c. Roentgenologic study of the stomach revealed an obstructing lesion of the outlet, probably duodenal ulcer. While under treatment at the hospital, gastric retention continued. At operation, a mass involving the entire pyloric antrum was resected. It proved to be an adenocarcinoma of the colloid type, graded 4.

The clinical diagnosis in this case was pyloric obstruction, probably duodenal ulcer. The only points favoring a diagnosis of carcinoma of the stomach were: (1) age, (2) relatively low values for acidity (not uncommon with an obstructing ulcer), (3) persistence of retention under treatment, and (4) secondary anemia without gross bleeding.

Anemia

Anemia is one of the commonest findings in malignant disease. This is particularly true of malignant disease of the gastro-intestinal tract, and anemia at times is the first and presenting symptom in carcinoma of the stomach. The anemia usually depends on the presence of an ulcerating or polypoid lesion. If this lesion is in such a position in the stomach so as not to interfere with its emptying, anemia may be present before any other symptom develops. The anemia depends apparently on bleeding, which in turn is the result of ulceration into vessels or of necrosis and sloughing of small vessels in the growth. It may be sustained in part by poor nutrition of the individual because of the carcinoma, or it may possibly result from a disturbance in the metabolism of hematopoietic substances (intrinsic factor of pernicious anemia).

Carcinoma of the stomach rarely produces gross bleeding except as a terminal phenomenon. In only 1 per cent of cases does it lead to gross hematemesis, and of those in which patients complain of hematemesis studies at the clinic indicate that in 12 per cent the bleeding is due to this disease.

The relationship of carcinoma of the stomach and pernicious anemia has been studied by Conner and Birkeland, and apparently when the two diseases coexist it is a coincidence rather than because there is a definite relationship between the two. The following report of a case indicates the difficulty in diagnosis presented by patients with carcinoma of the stomach and anemia.

Case 4.—A man, aged sixty-four years, stated that two years before coming to the clinic he had become weak and pallid. A diagnosis of pernicious anemia had been made by the physician at his home; roentgenologic study of the stomach had revealed nothing of significance. Treatment with liver and iron had given a satisfactory result. Later, anemia had developed whenever treatment was stopped for several weeks.

Three weeks before admission, anemia had recurred and, while it responded to the same treatment as previously given, roentgenologic study of the stomach disclosed a gastric lesion. The only history suggesting gastro-intestinal disease was the intermittent occurrence of heartburn, for two years, and occasional brief episodes of vomiting. The patient had lost 6 pounds (2.7 kg.).

Physical examination revealed marked pallor and the neurologic signs of combined sclerosis. The value for hemoglobin was 12.0 gm. per 100 c.c. of blood, erythrocytes numbered 3,280,000 per cubic millimeter, and examination of blood smears revealed morphologic changes characteristic of pernicious anemia. Hydrochloric acid was absent in the gastric juice, and blood was aspirated from the stomach. Roentgenologic study gave evidence of an extensive polypoid lesion of the stomach with

ulceration. At operation, the lesion proved to be an ulcerating polypoid carcinoma, of grade 3, with glandular involvement.

In this case the symptoms of carcinoma were minimal, and the lesion was discovered only because the patient's physician was alert to the possibility of a gastric lesion as the significant underlying disease in some cases of marked anemia. This demonstrates the importance of making a roentgenologic study of the stomach of all patients with pernicious anemia.

General Decline and Nutritional Disturbances

Patients who present themselves because of a general decline in health or because of loss of weight and strength not infrequently have carcinoma of the stomach even though gastro-intestinal symptoms are absent. Not uncommonly symptoms may begin with "flu" or with an acute infection. Anorexia may be the only symptom, or pallor and weakness alone may be present. It is important to recall that carcinoma of the stomach may develop in the presence of any chronic disease. In the presence of these clinical symptoms the carcinoma is not infrequently situated in the fundus or cardiac portion of the stomach, where it may be difficult to find roentgenologically.

Occasionally, specific nutritional disturbances will occur as a result of carcinoma of the stomach. Eusterman and O'Leary have emphasized the development of pellagra in association with gastro-intestinal diseases, particularly those producing obstruction.

The following case is one in which the outstanding symptoms were those of pellagra and in which the disease was the result of carcinoma of the stomach.

Case 5.—A man, fifty-eight years of age, came to the clinic because of diarrhea, weakness, swelling of the legs, and sunburn of the hands. One year previously, dull epigastric distress had developed, with anorexia, and loss of weight and strength. Four months previously, the patient had had three to four light-brown, foul, liquid stools daily. Several roentgenologic studies of the gastro-intestinal tract during this interval had given negative results. Two months before admission, edema of the ankles had occurred and, five weeks later, while trying to improve his health by taking sun baths, the patient had become unusually sunburned on the hands and nose. Because of the gastric symptoms, the patient had been on a very limited diet for months. Physical examination revealed the typical appearance of pellagra. The patient was emaciated, and edema of the legs and an epigastric mass were present. The value for hemoglobin was 9.23 gm. per 100 c.c. of blood, and achlorhydria was present. Studies of the blood calcium and serum proteins showed these values to be lower than normal. Roentgenologic study of the long bones revealed some osteoporosis and that of the stomach a carcinoma involving the middle third portion. At exploration this proved to be an inoperable lesion.

Metastasis

Rarely will the outstanding symptoms presented by a patient with carcinoma of the stomach be the result of metastasis. Metastasis generally does not occur early, but occasionally it may be extensive when the original lesion is small. The usual sites of metastasis, the liver, associated lymph nodes, peritoneum, pancreas, pleura, and lungs, are not commonly involved early enough to provoke symptoms before the initial lesion does. If metastasis produces the presenting symptoms, the lesion in the stomach is most likely in a "silent spot" and the metastasis involves a very important organ or region.

The following case illustrates this mode of onset of the disease:

Case 6.—A man, forty years of age, came to the clinic eight months after the onset of anorexia and weakness; he had lost 30 to 40 pounds (13.6 to 18.1 kg.). Four months before admission, vague, low, abdominal cramps with diarrhea had developed, but this had been relieved by medical treatment. At that same time, while walking, stiffness of the left leg and arm had suddenly developed, and for six weeks he had been unable to walk. Some residual stiffness of the leg had persisted. Three weeks before registration, blurred vision, forgetfulness, and childishness were noted. On physical examination the following were observed: left homonymous hemianopia, left hemiparesis, mental slowness, and a left Babinski reflex. The value for hemoglobin was 13.1 gm. per 100 c.c. of blood. Achlorhydria was present. Roentgenologic study of the stomach revealed an ulcerating carcinoma of the cardiac portion, and a neurologic diagnosis was made of multiple metastasis to the brain. Death occurred six weeks later.

In this case the predominance of neurologic symptoms could easily have led one to overlook the gastro-intestinal disease.

Comment

It should be emphasized again that the physician must be constantly on the alert for early symptoms of carcinoma of the stomach, since on early diagnosis rests the real hope of cure. Although many patients with this disease present

the so-called classical or typical history and findings, so that diagnosis is relatively easy, the lesion in such cases is often inoperable and usually incurable. In those cases in which there are early symptoms and in which only the suspicion of the disease is aroused clinically the roentgenologist will more often find a resectable lesion and therefore one more likely to be curable.

Summary

Carcinoma of the stomach may produce a variety of clinical syndromes in which the predominating symptoms may be: (1) typical, (2) similar to those of ulcer of long or short duration, (3) of pyloric obstruction, (4) of anemia, (5) of general decline in health or of nutritional disturbance, or (6) of metastatic involvement.

The significant clinical features, emphasized by Eusterman, which suggest the occurrence of malignant disease in the presence of a previously known gastric lesion are: (1) disappearance of intermittency of exacerbation of symptoms with substitution of a continuous or remittent clinical course; (2) irregularity, diminution, or disappearance of pain-food-ease sequence; (3) substitution of usual pain or distress by a dull ache, more or less constant, and eventually aggravated rather than eased by alimentation; (4) loss of appetite and onset of nausea even though acids are normal or elevated; (5) loss of weight and strength out of proportion to reduction of intake of food; (6) advanced age and recent development of symptoms; (7) diminished secretion of acid; (8) disturbance of motor function of the stomach; (9) onset of anemia in the absence of gross bleeding; (10) appearance, increase, or persistence of occult blood in the gastric content and in the feces while the patient is on a meat-free diet; (11) residuum in the fasting stomach in the absence of retention of barium at the end of six hours.

A STUDY OF THE MORTALITY OF PREMATURE INFANTS DELIVERED BY CESAREAN SECTION*

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WHILE the mortality rate for prematures has been greatly reduced in recent years, there is yet a great deal to be desired in our understanding of this problem. If a premature dies and no definite cause of death is found, he is usually classified as "nonviable," yet it is always difficult to explain just why a well developed, healthy looking premature fails and dies within a few hours or days, while frequently another much smaller, and less promising looking baby, receiving the same care, thrives and gains steadily. During the past two years, we were particularly impressed by the death of two prematures that were delivered by cesarean section because of central placenta previa as a complication of pregnancy. In both of these cases, the babies were well developed and large enough so that they should have been saved. Yet they both died within twelve hours. There was in both cases a marked wax-like paleness, with repeated cyanotic attacks and no other physical findings. Unfortunately, an autopsy was not obtained in either case.

Obstetricians have long recognized that placenta previa, as a complication of pregnancy, offers grave danger to both the mother and the child. Obstetrical literature of recent years furnishes a wealth of statistics on maternal and fetal mortality, along with the statement that the fetal mortality is largely accounted for by prematures. A vast majority of these writers agree that cesarean section offers the best chance of reducing these mortalities. Bill,[2] Von Ammon,[6] King,[4] and many others, covering thousands of cases of placenta previa, show an infant mortality with cesarean delivery of 15-30 per cent and a mortality of from 20-75 per cent with various methods of vaginal delivery. Very few actual statistics on prematures are given.

A review of our records reveals that during the past five years a total of forty-one living infants were delivered by cesarean section at the

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University Hospital and Abbott Hospital combined. Six of these infants died. Of these forty-one infants, twelve were prematures with an average birth weight of 2,246 gms. Of the twelve prematures, there were five deaths or a premature mortality of 41 per cent. A survey of all living prematures delivered by vaginal methods in the same hospitals for the five year period reveals that out of 179 cases there were sixty-one deaths, or a 34 per cent mortality. Nearly half of these deaths occurred within forty-eight hours of birth, and the following table demonstrates that the larger the premature and the closer he was to term, the better his chance of living.

TABLE I

Weight	Mortality
Under 1,000 gm.	87.5%
1,000–1,500 gm.	68
1,500–2,000 gm.	42
2,000 gms. or over	17

Quite obviously, percentages on such a small number of cases mean little if anything. However, of the twelve prematures delivered by cesarean section, four were so delivered because of a central placenta previa. Of these four, there were three weighing less than 2,000 grams and all three died. The weights of those dying were 1,180, 1,630 and 1,840 grams. This 100 per cent mortality for the placenta previa group under 2,000 grams may be significant. The two larger ones, at least, should have had a 58 per cent chance to live according to the mortality rate of prematures as a whole of like weight. Clifford,[4] in a rather large series of prematures of all sizes, where placenta previa complicated the pregnancy, found a 50 per cent fetal mortality if delivery was made by cesarean section, and a 70 per cent mortality if by various vaginal methods. He, at the same time, found a 54 per cent mortality for prematures as a whole, even in uncomplicated pregnancy, if delivered by section, and concludes that the high mortality of placenta previa prematures delivered by cesarean is not due to their being potentially less viable, but to other factors. He calls attention particularly to the influence of morphine and anesthesia given with cesarean section, and shows a definite and progressive increase of fetal mortality with increased dosage of morphine.

In our cases, the mothers had had no morphine, but let us consider the theory that a lowered blood volume may play an important rôle in the mortality of prematures as a whole and particularly in prematures delivered by cesarean section.

Since speed of operation is essential to the mother in cesarean delivery, it is the custom of obstetricians to clamp and cut the cord immediately upon opening the uterus, delivering the baby at once to an assistant. Schücking, in 1877, and Budin, in 1886, demonstrated, in normal deliveries, that if the cord was ligated immediately after birth an average of 90 c.c. of fetal blood in the placenta was lost to the baby. Schücking's determinations were made by placing the baby on a scale immediately after birth and recording the weight then and again after pulsation in the cord had ceased. He believed that this blood was regained by the baby through placental compression under uterine contraction. Budin's determinations were made by ligating the cord immediately and measuring the amount of blood that escaped from the maternal end of the cord. He advanced the additional theory that this blood would normally be regained by the baby by thoracic aspiration produced by respiration and crying.

Lucas and Deering, using the dye method, found that the fetal blood volume of newborns during the first fifteen days of life varied widely from 107 to 195 c.c. per kilo. If these figures apply to the premature, it would indicate that a premature weighing 1,500 gm. would have a total blood volume of from 160 to 292 c.c., while a premature of 2,000 gm. would have a total blood volume of from 214 to 390 c.c. Bakwin and Rivkin,[5] also using the dye method, obtained even lower figures for blood volume, namely, 71 to 148 c.c. per kilogram. The placenta for a premature is smaller than for a full term baby, and no doubt 90 c.c. is too high a figure for the estimated amount of fetal blood present in the placenta. If, though, we cut the amount in half and use 50 c.c. as an average, it represents a sizeable percentage of the total blood volume, perhaps as high as 33 per cent in some cases. If prematures delivered by cesarean do suffer any such loss in their total blood volume, it is easy to understand why so many become cyanosed and why the mortality is so high during the first forty-eight hours. This theory, it would

seem, is further strengthened by our experience in increasing the rate of gain of prematures by giving small amounts of blood during the first days of life and by Hofmeier, Zwekfel and Ribemont's observation that the initial loss of weight in the first few days of life is usually less after late than early ligation of the cord.

Dr. R. T. LaVake, Minneapolis, in discussing this with me has suggested that it would seem feasible and wise to modify the present technic of cesarean section by delivering the baby, cord and placenta intact, to an assistant. If this was done, no haste would be necessary in clamping the cord and mechanical pressure could be exerted on the placenta to facilitate the regaining by the baby of the fetal blood present in the placenta at birth.

To go a step further, if this theory of lowered blood volume as a factor increasing mortality in prematures delivered by cesareans, is sound, it may likewise apply to a degree at least in all premature births. So much emphasis has been justly placed on the necessity of keeping a premature warm, that it seems quite possible that in order to avoid chilling, and in order to establish respiration promptly, in many cases of vaginal delivery, the cord is ligated before pulsation has ceased. The necessity of early ligation of the cord could be largely obviated by providing delivery rooms with rolls of sterile cotton, sterile premature gowns or suitable heat lamps with which to keep the infant warm until all pulsation of the cord has ceased. In those cases, where an early ligation of the cord is absolutely essential, an early intraperitoneal transfusion might be of benefit. It is my hope and belief that if these changes in technic are instituted, a reduction in mortality for all prematures will follow, and especially for those delivered by cesarean section.

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THE AMBULANT TREATMENT OF VARICOSE VEINS BY LIGATION, DIVISION AND INJECTION OF THE DISTAL SEGMENT*

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A DECADE has now passed since the introduction and popularization in this country of the injection treatment of varicose veins, although it had been used extensively in Europe for a quarter of a century.

This form of treatment became very popular following the stimulus given by such men as McPheeters, de Takats, Homans, Theis, Howard and many others. Large series of cases were reported in the literature and many references accumulated. Various chemical solutions were used extensively, among which were mercury bichloride, sodium salicylate, salt, sugar, and, more recently, quinine and urethane, and sodium morrhuate. Many articles appeared extolling one or the other solution. Gradually, however, some of these solutions became less popular as the quest for the ideal sclerosing solution went on. The mercury solutions were discontinued because of their toxicity. The salicylate and salt solutions became less popular because of the severe pain which they caused and the danger of sloughing when injected outside the vein lumen. The sugar solutions still maintain some of their popularity, but at the present time it would seem that qui-

*From the Duluth Clinic.

nine and urethane and sodium morrhuate are the sclerosing agents of choice.

During the first half of this decade the literature contained many references dealing especially with technic, complications and mortality, justifying the method over the older treatment of surgical removal.

Kilbourne in 1929 reported eighteen deaths in 4,607 operations, or one in 250, compared to about one in 5,000 injections. McPheeters, after a very thorough review of the literature, reported a mortality rate from pulmonary emboli of 0.0075 per cent after injection compared to 0.53 per cent after operative treatment.

In 1930 and thereafter the medical literature of varicose veins dealt profusely with results of treatment. The incidence of recurrences varied widely, most authors reporting from 3 to 15 per cent. Others, however, reported less favorably, Howard, et al., in 1931, reporting a recurrence of 79 per cent.

Trout in 1929 stated that recurrences were due to failure to tie off the long saphenous vein and the perforating veins.

McPheeters stated:

"If the great saphenous trunk is not thrombosed and firm up to the saphenofemoral opening, we must expect to have both a recurrence of the old varicose vein and the formation of many new ones through the opening up of many collaterals."

Thies stated that two essentials were necessary to minimize recurrences:

"(1) The extent and completeness of the destruction of the intima; and (2) the type of primary thrombus formation. The activity of the circulation determined whether one was to have a stagnant red clot or a white thrombus. More rapid recurrences occur in postoperative thrombophlebitis, bacterial thrombophlebitis after ligations, and injuries where the activity of the circulation has been retarded."

In 1930 de Takats suggested the ambulatory ligation of the saphenous vein to diminish recurrences. This method was indicated where the saphenous vein above the knee was dilated and showed a reflux from above. By so ligating, the pressure from above was removed, a barrier to thrombi was created and incidentally the number of subsequent injections was reduced. Subsequently de Takats reported his results in 200 cases so treated. Simultaneous injections at the time of ligation were not advised because of the frequent occurrence of distal thromboses or because such a procedure might activate a resting infection. Twenty per cent had complete obliteration after ligation. Complications were reported in 2.5 per cent, and these included one death. In sixty private cases he reported a recurrence in only 3 per cent. The indications for this procedure de Takats stated were three:

1. Valvular incompetence of the long saphenous vein in the thigh.
2. Valvular incompetence of the anastomotic branches if they resist injection treatments.
3. Ascending thrombophlebitis of the saphenous vein.

Howard, Jackson and Mahan in reporting on recurrences following injection stated:

"The results of follow-up examinations with the microscopic studies of the fate of therapeutic thrombosis convinced the authors that treatment by injection unaided by ligation, excision or stripping of main venous channels and perforating veins when incompetent, will not serve to obtain permanent cure in cases of varicose veins except in the few isolated cases of dilated single veins with competent saphenous and perforating valves."

Homans stated:

"The truth is that it is impossible that any procedure which fails to do what a complete excision does (that is, remove the great saphenous vein from the femoral nearly to the ankle and with many of its branches) can have nearly as good late results. There is a question whether it may not be worth while in some instances to divide the varicosed saphenous vein as high as possible, that is, near the saphenous opening, and make the injection into the distal portion."

In 1930 the author in a report on the use of sodium chloride in the treatment of varicose veins mentioned that in occasional cases the great saphenous vein was ligated at the saphenofemoral juncture and excised to the knee, and the remaining varicosities below the knee were later injected. The frequency of recurrences, the frequent inability to thrombose satisfactorily the dilated and incompetent great saphenous vein, and the all too frequent resulting thrombophlebitis, which in one case terminated fatally by multiple metastatic abscesses secondary to a suppurative thrombophlebitis, led the author since that time to follow a procedure which may be described as the ambulatory division and ligation of the saphenous vein and simultaneous injection of the distal segment.

This procedure is not carried out routinely, but only in those cases where the great saphenous vein is obviously incompetent and can be either seen or palpated as a distended dilated trunk. Where the saphenous vein in the thigh is obviously competent the procedure is confined to simple injections, according to accepted technic, into the varicosities. The sclerosing solutions of choice are quinine and urethane, and sodium morrhuate.

In those cases where ligation, division and injection of the distal segment is determined upon the technic is as follows: The operative procedure is carried out, usually, in an operating room in the clinic. If the dilated incompetent saphenous veins involve both extremities, only one side is done at a time. The patient is placed supine on the operating table, the operative field is prepared, and after infiltration with procaine hydrochloride a transverse incision is made, high and on the inner aspect of the thigh. Dissection is carried down to the vein, which is isolated and then divided between forceps close to its femoral opening. The proximal stump is doubly ligated with Plain No. 1 catgut. A canula or large blunt needle which has been previously connected with a 20 c.c. Luer syringe containing 10 to 15 or 20 c.c. of sodium morrhuate is now inserted into the open lumen of the distal segment. Great care is used so that none of the solution escapes into the wound. The vein is ligated firmly about the needle or canula. The solution is allowed to flow into the distal vein. No great pressure is needed. The vein is then firmly and doubly ligated as the canula or needle is withdrawn and the wound is closed. A dressing is placed over the operative field and strapped firmly in position. Beginning at the ankle the leg is then wrapped snugly to the thigh with an Ace compression bandage.

The whole procedure only takes a few moments and the patient is allowed to get up and return home immediately. He is directed to remain up and to walk about. He is directed to return in two or three days for observation. Usually at this time the vein is firm and will be found to be completely thrombosed. In a few cases a phlebitis or periphlebitis may be present which will further restrict the patient, but this usually subsides promptly with the use of cold compresses. A brownish discoloration of the skin may be present, but this as a rule disappears gradually. After the first postoperative observation the patient may return to his usual duties and not be greatly handicapped. He is seen repeatedly at intervals until the wound is healed and the reaction has subsided. If there are any remaining varicosities, injections may then be given. For subsequent treatments quinine and urethane are preferred.

Conclusions

The frequency of recurrences after injection of varicose veins has led many investigators to suggest a combination of surgical and non-operative treatment, namely, ligation of the incompetent saphenous vein to be followed simultaneously or subsequently by injection into the non-thrombosed segments.

The ambulatory ligation of the saphenous vein has been proposed by de Takats and his results in 200 cases have been reported.

The ambulatory ligation and injection of the saphenous vein is proposed by the author and in his experience has given very gratifying results.

SODIUM RICINOLEATE AS A SCLEROSING AGENT*

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Minneapolis

A NEW substance for the sclerosing of varicose veins is herewith presented. We feel that it has advantages over any other solution so far used. The solution is prepared from castor oil, which is composed largely of ricinoleic acid glyceride. The sodium ricinoleate is prepared in accordance with the directions of Rider.[2] The product resulting from this purification process is approximately 97 to 98 per cent pure sodium ricinoleate contaminated only with

*From the Veins and Ulcer Clinic of the Minneapolis General Hospital.

small amounts of sodium oleate and sodium linoleate. Repeated experimental work has shown that these two salts of unsaturated fatty acids are similar in chemical and physiological properties to sodium ricinoleate and that their presence in the sodium ricinoleate solution is not harmful.

Undoubtedly, one of the greatest contributing factors to the variations in the effectiveness of sodium morrhuate solutions is the fact that these solutions are not made from a single chemical product and that the composition of the materials used varies considerably with manufacturing methods.

Biegeleisen[1] made a critical study of sodium morrhuate and found great variations in its actions, and came to the following conclusions:

1. Sodium morrhuate is an unknown, relatively unstable mixture of sodium salts of the unsaturated fatty acids found in cod liver oil.
2. Its potency diminishes with age, and is not uniform.
3. It is occasionally capable of slough formation.
4. No local anesthetic should be added to the mixture.
5. The advisability of incorporating an antiseptic in the solution is open to question.
6. The irritating effect of sodium morrhuate is due to its soapy characteristics, and has been duplicated experimentally by a solution of commercial liquid soap.
7. Sodium oleate, which is one of the fatty acid salts present in sodium morrhuate, has been tested and found to possess sclerotic power.
8. The continued testing of the other fatty acid salts present in the mixture is necessary if a standardized pure product is to be developed.

In contradistinction to this, sodium ricinoleate can be made in very pure form and its composition controlled within very narrow limits. The advantage of this fact can easily be appreciated. It means that we are always using a substance of definite, stable, chemical composition which will give a uniform clinical result limited only by the patient's individual reactions.

Sodium ricinoleate is put into solution in distilled water and the P_H of the resultant solution adjusted to 8.0. The solution is a pale yellow limpid product, the composition of which in successive batches is exactly known.

The clinical activity of sodium ricinoleate solution is undoubtedly very similar to that of sodium morrhuate. According to Gerwe (private communication) "it is a powerful hemolytic agent which on contact with blood cells hemolyzes them, setting free thromboplastic stromata and other hemolytic debris which are potential substances to initiate the formation of thrombi." These thrombi or clots are a brown, jelly-like, soft, coagulated mass which resists resolution or absorption for a long time. It is for this characteristic that we have been wishing. We want these clots to remain in the veins until they become firmly organized and the vein permanently obliterated.

We have used experimental acid, alkaline, and neutral solutions in 5 and 10 per cent strengths. The acid and alkaline solutions have no advantage over the neutral solution. We also believe that the 5 per cent solution is the best for general use. Stronger solutions have no particular advantage and have the disadvantage of producing more pain and more tissue damage when perivascular infiltration occurs.

In trying out a new substance it is well to always use the same method. Our procedure, which gives us uniformly good results, is as follows: When the patient is first seen a history is obtained, drawings of the veins are made on charts, and a urinalysis is done. If there are no contraindications, we then inject 1 c.c. of sodium ricinoleate in a small loop of vein in the lower leg, as a test to see if the patient has any idiosyncrasy to the solution which manifets itself by allergic reactions, faintness, weak pulse, and cold sweats. When using sodium morrhuate, we have had several severe reactions within a few minutes after injection. Several patients developed a generalized eczema covering the entire body. Two of these patients had to be hospitalized. A number of such experiences have been reported in the literature recently by others. With sodium ricinoleate the only reactions in a series of 300 cases have been those in which irregular purplish red blotches varying in size from 2 to 20 mm. appeared in the skin drained by the offending vein. In two patients these patches took the form of a localized urticaria. However, there

were no subjective symptoms. A cramping pain in the lower leg and foot is sometimes experienced when 5 c.c. doses are used.

The patient returns for a second injection in two or three days. Three to 5 cubic centimeters are injected at the highest point possible. The needle on an empty 2 c.c. syringe is inserted into the vein carefully while the patient sits on the edge of a table. Then the patient lies down and the leg is elevated to drain as much of the blood from the vein as possible. The small empty syringe is replaced by one containing the solution, without moving the needle. The injection is made carefully, watching for evidences of perivascular injection the while. A tourniquet is applied near the groin. The syringe is removed, leaving the needle in place. The patient is asked to sit up with the leg hanging down. This change in position gives the solution a chance to gravitate downwards. The tourniquet is removed in from three to five minutes. The needle is then withdrawn and a small compress taped over the injection site.

By this method we have often been able to sclerose the veins of an entire leg by two or three injections. The advantage of puncturing the vein only two or three times is apparent, as every time the wall is penetrated there is a possibility of a slough should some of the solution leak out through the needle opening. Naturally, the less stoical patients prefer this method to the multiple puncture method previously used in this clinic.

It is our opinion that ligation of the saphenous vein in the groin greatly decreases the possibility of recurrence in those patients having large varicosities extending into the thigh. Under local infiltration of 2 per cent procaine the vein is exposed through a 5 to 10 cm. incision. A small section is excised and the cut ends doubly ligated, using chromic catgut No. 1. Then 3 to 5 c.c. of the sclerosing solution is injected into the exposed distal stump and the skin closed, using dermal or skin clips. The patient is allowed to go home at once, and may be up and about as desired. Should the leg become quite painful we advise hot applications.

All patients treated should be checked for recurrences at intervals of from two weeks to two months for a year.

Our series consists of 300 patients injected at the Minneapolis General Hospital and in private practice. In over 600 injections there were six small sloughs which probably were due to faulty technic or leakage into the perivascular tissue. Two patients were given injections of 1 c.c. of the 5 per cent sodium ricinoleate with no effect on the varicosity. This was undoubtedly due to the fact that the veins were of such large caliber that the solution was diluted too much by the blood in the lumen. Later, however, when 3 to 5 c.c. of the same solution were injected into the well emptied vein very good results were obtained.

Summary

1. Sodium ricinoleate in a 5 per cent aqueous solution is stable and well suited for sclerosing.
2. This solution does not produce a systemic reaction when used as recommended.
3. The results are uniformly good.
4. A large dose may occasionally produce a cramp in the leg and foot.
5. A perivascular injection may produce a slough.
6. Recurrences appear less frequently because the clot is firmer and not so easily absorbed.

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SUPRACONDYLAR FRACTURES OF THE ELBOW AND THEIR COMPLICATIONS*

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IN a series of 100 consecutive elbow fractures of all types seen by the author[3] in private practice, 40 per cent occurred in children under eleven years of age, and 30 per cent of the entire series were supra- or diacondylar in type. These figures support the impression that the supracondylar fracture of the elbow is one of the most common. Everyone in general practice is familiar with this fracture, yet it sometimes is overlooked, is frequently badly treated, and is responsible for many malpractice suits today.

The clinical picture of a supracondylar fracture is well known. A child with a swollen, painful elbow, in which the three bony landmarks retain their normal relationship to each other, should arouse suspicion of a supracondylar fracture. Palpation may reveal a tender point just above the condyles, or the sharp edge of the proximal fragment may be felt anteriorly. Manipulation may reveal crepitus or false motion. Great swelling, which obliterates the landmarks, should also arouse suspicions. The x-ray study, which is imperative in such a picture, reveals the fracture.

It is important to recognize, in studying the x-ray, that there is usually a rotatory displacement of the distal fragment about the vertical axis of the shaft. The upper fragment seems to be rotated inward because the lower fragment is displaced and rotated outward. It is well to recall that the lower epiphysis of the humerus points forward along an axis of approximately 135 degrees with the shaft. This fact is frequently overlooked in treating these fractures and is responsible for many poor results.[2]

Supracondylar fractures are usually treated in the flexed position, but they are *not reduced* by the flexed position. The time-honored principles of fracture reduction should be applied in these cases—traction, counter-traction, and manipulation. The arm is put up in the flexed position because the triceps tendon steadies the fragments when the fracture is properly reduced.[6] Acute flexion is not necessary and, if applied blindly, may lead to disaster. The degree of flexion employed should be inversely proportional to the swelling.

The adhesive dressing of Sir Robert Jones is most commonly employed in these cases, but it must be properly applied[5] to avoid trouble. The broad strap of adhesive should lie flat on the medial side of the arm and forearm, and should be applied evenly to the lateral side, letting the ends cross where they may. The adhesive dressing does not prevent rotation deformities in severe fractures, nor can it be employed when there is great swelling. In such cases the molded posterior splint of plaster of Paris is very satisfactory, and is more likely to remain efficient as the swelling subsides. In addition to the simple adhesive, or posterior plaster splint, I usually place the extremity on a simple platform abduction splint at shoulder level. This position furnishes the elevation indicated by great swelling and meets the tendency to lateral and rotation displacements nicely. Anterior splints and dressings which completely encircle the extremity, should never be used because they may interfere with the circulation.

The patient should be seen by the physician four hours after the dressings are applied; and, during the first twenty-four hours of treatment, he should be seen at least every four hours by a competent person if not by the physician himself. The circulation of the fingers, as well as the sensation in them, must be known with certainty, especially during the first twenty-four hours.

The healing period varies from six to twelve weeks in these fractures, but the position of acute flexion should not be maintained over three weeks. Callus is usually firm enough to permit gradual extension after three weeks. Passive motions, in my experience, have only prolonged the healing period and contributed to complicating myositis ossificans. A simple sling can be employed after three weeks—gradually permitting more extension during the day but returning to position of acute flexion at night. If the po-

*Read before the Eleventh District Medical Meeting of Wisconsin at Superior, Wisconsin, August 15, 1934.

sition of acute flexion is maintained without interruption much longer than three weeks, there may be limitation of extension that is difficult to overcome. This is due to firm fibrosis of the cubital clot. After bony union is firm such a scar may respond to gradual stretching with a weight *tied* to the wrist.

Complications

The poor results in supracondylar fractures are usually due to failure to secure good reduction, to failure to maintain reduction, or to prolonged immobilization. This type of fracture, however, is notorious for three complications which frequently occur. They are myositis ossificans, Volkmann's paralysis, and malpractice suits.

Myositis ossificans, or ossifying hematoma, is prone to occur in injuries about the elbow.[1] Perhaps it results from extensive stripping up of periosteum or from extensive injury to soft parts. The exact reason for its formation is unknown, but certainly it is prone to occur after frequently repeated or clumsy manipulations. Its development is often accelerated by clumsy manipulations and too early attempts at passive motion. The process is usually self-limited in elbow fractures. Operation to remove the mechanical block by myositis ossificans should be delayed until growth of the mass has stopped; otherwise it may not check the process at all.

Volkmann's paralysis is the *bete noir* of these fractures. It is a muscular ischemia, not a nerve injury, and results from interference with the venous return. The causes of this interference are usually incomplete reduction of the fracture, application of an anterior splint to the unreduced fracture, a tight circular dressing, or the position of acute flexion. It is important to remember that Volkmann's paralysis does occur from hemorrhage in the deep tissues, which may be severe enough to stretch the fascia and skin so as to cut off the return venous flow. The early symptoms are important. They are swelling, numbness, tingling, pain and cyanosis—in that order. Paralysis does not obtain for a few hours after the onset of these symptoms. If external factors are producing the interference, they must be relieved —circular dressings cut, volar splints removed, and the position of acute flexion changed immediately. The extremity should be elevated and external heat applied. When the trouble is due to internal hemorrhage, the hematoma can be aspirated or drained by incision at the site of greatest swelling. Should it be necessary, multiple incisions can be made through the fascia to relieve the pressure. Rarely it is necessary to reduce the fracture by leverage through a posterior incision splitting the triceps.

The *medico-legal* complications of supracondylar fractures nearly all arise from claims of negligence. The responsibility of the physician begins when he starts to treat the case.[4] A physician is honor bound to render first aid, but he need not accept a case for treatment unless he wishes. The acceptance of the case for treatment "implies that the physician possesses reasonable learning and skill such as is ordinarily possessed by the physicians of the locality where he practices." He must exercise reasonable care and his best judgment. He is considered negligent if his dressings interfere with the circulation.

It is important therefore to make a careful examination and then advise the patient, or his family, of the exact condition.

If disturbances in circulation and sensation are present at the outset, it is wise to make such facts known before witnesses and write them in the record.

Secure an x-ray before you begin and *after* your manipulation.

It is unwise to begin unless you are qualified to treat the condition by accepted methods and have the necessary equipment.

A consultant should be called if the condition is grave or is not progressing satisfactorily and *pleasantly.*

Lastly, the physician should be careful of his prognosis in these cases and particularly careful of his remarks about other physicians.

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ANGIOID STREAKS OF THE RETINA ASSOCIATED WITH PSEUDOXANTHOMA ELASTICUM*

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THE first report of angioid streaks of the retina was made by R. W. Downe in 1889. From then until 1932 there have been some ninety cases reported in the literature, but it was not until 1929 that the relation between the skin disease called pseudoxanthoma elasticum and angioid streaks was first suggested by Ester Grönblad. Since that time the simultaneous occurrence of both in certain patients has been reported and a causative relationship suggested by a number of observers. Ester Grönblad has summarized and correlated all that was known about angioid streaks up to the year 1932 in an extensive treatise published as a supplement to the Acta Ophthalmologica.

Through her studies she arrived at the following conclusions: Angioid streaks are not vessels, nor are they caused by hemorrhages or folds in the retina. The streaks are ruptures in the lamina vitrea and inner layers of the choroid due to a degenerative process that attacks elastic tissue. It is the same degenerative process that attacks the elastic tissue of the skin to produce pseudoxanthoma elasticum. The hemorrhages which appear in the fundus are secondary. Angioid streaks are, therefore, a localized manifestation of a systemic disease. This disease is an atrophic or dystrophic process of elastic tissue. It seems to be hereditary.

The fundus picture varies tremendously, but, in general, presents certain characteristics. A well developed case usually shows an area of choroiditis about the discs from which radiate the streaks that give the disease its name. These streaks may be broad or narrow, branched or unbranched, distinct or faint. They vary in color from gray, through brown to red. They often extend to the equator, where they ramify and end. Hemorrhages are common, especially about the macula. Irregular exudates and areas of pigmentation are also frequent. When the streaks cross the course of a vessel it is seen that the vessel lies superficial to the streak.

The case which I am presenting tonight exhibits both well developed fundus and well developed skin lesions. The latter were not recognized when first seen, largely because of my own ignorance and partly because of an interesting incident in the past history.

S. P., a thirty-five year old Polish woman from the country, came to me first on August 31, 1933, with this story: On August 8, while picking potato bugs in her garden, she had been seized with a violent headache. Thinking that it was caused by the heat of the sun, she quit her work and went into the house, but the headache did not cease. It kept her awake all night and continued with undiminished violence for twenty-four hours. Upon arising in the morning, she noticed that her vision was diminished, "as though there was a cloth before her eyes." Since that time her headache had gradually improved but was still severe at times. Her vision had not improved at all.

Her past history contained a few points of interest, one of which misled us. In the World War she served as a nurse on the Polish front for one year, during which time she was wounded twice and suffered powder burns about the arms, back, and shoulders. She came to this country nine years ago and married six years ago. There have been no pregnancies. Her husband had been married previously and had had one child with his first wife, that died when but three weeks old. As far as she was able to say, no one among her relatives had had either visual disturbance or skin disease. The rest of her past history and the family history was unimportant as far as her present illness was concerned.

Examination.—Upon examination it was found that her vision was 20/100 O.U. The external examination of both eyes gave entirely negative findings. Both fundi exhibited well developed pictures of angioid streaks, the left more advanced than the right. Both showed a degenerative choroiditis about the disc, from which radiated irregularly sized and shaped brownish streaks. The retinal vessels coursed over the streaks and appeared to be entirely normal. There were hemorrhages about both discs and both maculae, some of which were obviously interfering with vision. Just above the left macula there was found a circumscribed bluish white exudate about half the diameter of the disc that suggested a tubercle.

A diagnosis of angioid streaks, probably complicated by some intracranial pathologic changes, was made and the patient referred for a general examination.

*Read before the Minnesota Academy of Ophthalmology and Otolaryngology, October 13, 1934.

The Wassermann test and extensive blood and spinal fluid studies gave entirely negative findings. The only positive findings were three dead teeth and some peculiar skin changes on the arms, shoulders, and neck which the patient stated were powder burns. No cause for the violent headache was found.

Subsequent Course.—Headaches, nausea, vomiting with great pallor and loss in weight continued until December, 1933, when the patient was admitted to the University hospital, where she remained for one month. During this month she improved remarkably in every way. Even her persistent headaches became very much less.

After a few months at home she had another series of headaches in the spring of 1934. Her vision at that time with correction was O.D. 20/30 and O.S. 20/100. She improved again early in the summer and seemed well all summer. She was seen again in October, 1934, when she stated that her headaches returned in a mild form periodically and that her vision was improved. She was refracted and her best vision found to be O.D. 20/30, O.S. 20/50. The fundi appeared to be much as before, excepting that there were not so many hemorrhages present.

Discussion.—I happened to discuss this patient with Professor Rönne of Copenhagen last spring. It was he who suggested that a new search be made for skin lesions. Upon my return I again examined the powder burns on the patient's arms, shoulders, and neck. When examined closely, it was clearly seen that there was a symmetrical band of pathologic skin about the neck and a patch in each axilla that were distinctly different from the brown powder marks upon the arms, shoulders, and back of the neck. In a word, the former were typical lesions of pseudoxanthoma elasticum and corresponded exactly with the text-book picture.

This case serves to illustrates again the simultaneous occurrence of pseudoxanthoma elasticum and angioid streaks and to suggest a common etiology for the two. Unfortunately, there have never been any microscopic studies of angioid streaks and the two probably should not be accepted as manifestations of the same disease until it is demonstrated that the pathological pictures correspond.

The cause of the intense headache suffered by this patient is not clear. It may be that this disease occasionally produces intracranial lesions of a painful nature. On the other hand, the headache and vomiting may have been on another basis entirely. The patient's home conditions were obviously unhappy and the nervous reaction undoubtedly intensified her symptoms.

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Tularemia

The increase in reported cases of tularemia in recent years and the death last month of Dr. C. N. McCloud of Saint Paul from that cause have added increased concern and renewed interest in this comparatively rare disease.

Dr. R. K. Green of the Department of Bacteriology and Immunology of the University of Minnesota has been making a special study of the prevalence of the disease in the state. Besides being found in ground squirrels, rabbits and field mice, tularemia has been found in the sharp-tailed and rough grouse, the quail and sage hen. Experimentally the cat can be infected through the digestive tract while the ringneck pheasant seems particularly resistant to the infection.

While the infection can be spread by the ingestion of raw diseased flesh, the tick is mainly responsible for the spread of the disease. Rabbits are very generally heavily infested with ticks and it is the rabbit tick which infects the game birds. While the main danger of human infection lies in the handling of infected rabbits or birds, one may become infected from the bite of an infected tick, as occurred in the case of Dr. McCloud. The rabbit tick does not bite human beings, but it has lately been appreciated that the common wood tick may infect man.

There is evidence that tularemia may have been responsible for the decimation of the rabbit and grouse population in Minnesota in 1925 and 1926. If so, the disease is more widespread in animal and bird life than is commonly appreciated. The significance of this fact is the need for hunters to use precautions in the cleaning of wild game. While there is a comparatively slight chance of infection from the bite of the wood-tick, that danger also exists. Of course, there is more chance of becoming infected with Rocky Mountain spotted fever through the bite of the tick. This disease is much more serious and is showing an increased incidence and dissemination in recent years.

It is interesting in connection with tularemia to note that Moses forbade not only the eating but the touching of the hare (Lev. xl: 6, 8). Presumably Egyptian medicine of that period, which was of high order and in which Moses was undoubtedly well versed, was cognizant of some disease in rabbits.

Further study of the disease in animals and birds with a view to the conservation of animal and bird life, as well as to the prevention of human infection, is strongly indicated.

Dinitrophenol

The recent final report by Tainter[1] and coworkers of their experience with the therapeutic use of dinitrophenol in a series of cases of obesity emphasized that its administration was the method of last choice. The disadvantages of administration have been the production of undesirable side reactions which were unpredictable and occasionally alarming. The authors note that cataract developed in one of the patients in the series six months after discontinuance of the drug.

The use of the drug would be limited in the treatment of obesity by its proponents to those

[1]Tainter, M. L., Stockton, A. B., and Cutting, W. C.: Dinitrophenol in the treatment of obesity. Jour. Am. Med. Assn., 105:332, (Aug. 3) 1935.

individuals in whom all other methods of control fail; in other words, to the group in whom sometimes relatively minor decreases in diet were not obtained in the attempt to balance energy intake and outgo. But the caloric deficit to be obtained by safe doses of dinitrophenol is not greater than that gained by removing from the diet two pats of butter at each meal, as stated by Evans.[2] If a patient is unwilling or unable to coöperate to that extent, he would seem a poor subject for the use of a drug with admittedly definite risks. It would seem that continued obesity in such individuals might be much less hazardous than the treatment. Accordingly, dinitrophenol would not seem to merit a place in safe and non-meddlesome therapy.

The drug undoubtedly has great value in animal experimentation as it is a powerful stimulant of tissue metabolism, probably by direct action on the cells. It does not produce pulse acceleration and stimulation of the central nervous system similar to that noted after large doses of thyroid extract. Clinically, when a metabolic stimulant is indicated and thyroid substance is used, such reactions are a part of its virtue. They act as danger signals, which, along with determination of the basal metabolism, make such controlled thyroid therapy relatively safe and free from the subtle and insidious risks of dinitrophenol administration.

C. A. McK.

Football Injuries

From time to time the question is raised as to whether the hazards of football are not too great. Discussion quiets down and football continues to be played—in fact, it has been enjoying an increasing popularity both with the public and American youth in recent years. The training in manly courage, teamwork and good sportsmanship is an asset very much worth while. Everything should be done, however, to minimize the likelihood of serious and unnecessary injuries to the players.

The modification of football rules has doubtless descreased the chances of serious football injuries. Possibly further modification of the rules would help.

Landry* has made an interesting survey of football injuries from the literature and his personal experience at Tulane University. He refers to some of Eastwood's conclusions. This writer stated that head injuries, which are the most serious types, are always due to blocking, being blocked, or line defense. He further found that most injuries occurred in blocking, next in tackling, and next in being blocked. This part of the play seems to be most hazardous. Headgears are therefore obviously desirable for the protection of the player, although too hard a headgear becomes a hazard for the opponent.

The flying tackle was a most dangerous maneuver for the tackler and was therefore ruled out. We used to hear a lot about "tackling low." It is the low tackle that is dangerous. It is very liable to lead to severe injury from violent impact with a knee or foot. Tackling the mid-thigh region is much safer.

In the speeding up of the game light equipment has become desirable. The elimination of the former protection of thighs and legs results in more hematomas and muscle injuries than formerly. The author wisely remarks that "Charlie horse," which is a tearing of muscle fiber, requires heat and rest and *not massage*. More disabling, however, are the joint injuries. The knees head the list. A runner tackled from the side is likely to sustain a tearing of a lateral ligament, especially if tackled when his weight is all on one leg. The shoulder joint is not infrequently injured. A fall on the elbow or extended arm or a missed tackle, the shoulder hitting the ground violently, may result in a tear of the acromioclavicular ligament with prolonged disability. Ankle injury is less likely to result from being tackled than from running, especially on rough ground.

The fatalities due to football in 1933 amounted to thirty-seven, only twenty-eight of which, according to Eastwood, were directly attributable to the game. Of these, two occurred in college football, twelve in high school, twelve in sand lot play, et cetera. This much higher figure for high school play is not surprising, considering that the players are not only less experienced, but far more numerous.

Dublin's analysis of the mortality rate in college athletes graduating prior to 1905 which appeared in *Harper's Magazine* in 1928 is re-

[2]Evans, F. A.: In discussion of paper by Tainter, Stockton and Cutting.

*Landry, Lucian H.: Injuries peculiar to modern football. Am. Jour. Surg., 28:601, (June) 1935.

ferred to. Dublin found the rate for baseball players highest, crew members next, track next, and football players lowest—even lower than that for non-athletes. Phi Beta Kappa members lived longer than athletes.

The author concludes that the care of football injuries offers a special field for young surgeons. Coaches would do well to employ medical assistance more than they do, not only for treating injured football players, but for frequent examination. A slightly injured or fatigued player is more liable to serious injury than a sound and fresh player.

Snake Bite

Bites from poisonous snakes are of rare occurrence in Minnesota. And yet rattlers have been seen along the Mississippi River not far from the Twin Cities and elsewhere, and the bite from a rattler is a serious emergency.

Compared with the seriousness of snake bite in Brazil, for instance, where some 5,000 individuals are said to die yearly from the bites of poisonous snakes, and 20,000 in India, where ignorance and superstition aggravate the mortality from this cause, the situation in the United States does not seem very serious. Yet, Githens* has just reported the collection of the records of some 2,376 bites in this country from 1927 to 1934. According to his study the Texas diamondback rattlesnake exists to some extent in all sections of the United States. This is said to be due in some measure to the escape of this particular species from travelling showmen as occurred in Wisconsin. In the eastern half of the country the copperhead is more or less often encountered. These two snakes are the most dangerous as they are aggressive and strike without warning. The water moccasin and Florida diamondback rattler are found in a narrower range and are more limited to the wild districts of Florida particularly.

More than half the bites recorded by this observer involved the lower extremity, and most of the remainder the upper extremity. Less than 1 per cent were of the body and head. An appreciable number of children, snake catchers, showmen and scientists helped make up the list of those bitten.

Of the poisonous snakes, as a rule the larger the snake the more dangerous, since it possesses more venom. The exception seems to be an old snake that though large possesses less venom.

The Florida diamondback rattlesnake is the largest rattler in this country, and the Texas variety next. The other rattlers and the water moccasin are not so large and their bites are therefore less likely to cause death. Other factors modify the seriousness of snake bite. Crimmins mentions the practical point that a perceptible lump in the snake indicates that the snake has eaten within three days and its bite is therefore less likely to be fatal, as two-thirds of a snake's venom is discharged with a bite and two weeks are required for accumulation of the venom.

The old-time remedies for snake bite, whiskey and potassium permanganate, have gone into the discard. Modern treatment consists of prompt application of a tourniquet above the knee or elbow, multiple incision through the skin at the site of the bite and suction either by cupping or sucking. The value of antivenom serum has been firmly established. The serum manufactured by the Butantom Institute in Brazil, it is estimated, has reduced the mortality from 25 to 2.5 per cent in South America. Mulford makes a refined polyvalent serum† for use in North America for treating rattlesnake, copperhead and moccasin snake bites. Hutchinson reports a reduction of mortality from 10.8 to 3 per cent by the use of polyvalent serum given in most cases subcutaneously. The serum, however, is most efficacious if given intravenously, and intramuscular injection is better than the subcutaneous. The usual precautions must be taken in its administration as with other horse serums.

It is said that the picture presented by a person a few hours following a bite from a rattler is never to be forgotten. The swollen, brawny extremity, the presence of blebs near the fang marks, the pain and evidence of shock are striking. As the toxin is hemolytic and neurotoxic, the blood picture requires careful watching. Lowered blood pressure demands intravenous saline or glucose, and anemia indicates the need of blood transfusion. It is claimed by some that the aversion which amounts in most individuals to terror at the sight of a snake is an entirely

*Githens, Thomas S.: Snake bite in the United States. Scientific Monthly, 41:163, (Aug.) 1935.

†Mulford's Antivenom or North American Anti-Snake-Bite Serum is available day or night at the office of Sharp and Dohme, Inc., 256 First Avenue North, Minneapolis.

acquired characteristic and that the average child is not instinctively afraid of a snake. If so, children should continue to be educated. It is true that reptiles hold a certain fascination for many human beings. In this group Elsie Vener, the snake charmers, attendants in snake houses, certain scientists, and the individual in almost any small group of people who delights in handling at least the non-poisonous snake, may be placed.

OF GENERAL INTEREST

Dr. A. E. Sohmer of Mankato has just returned from a tour of Northern Minnesota.

* * *

Announcement has been received of the engagement of Dr. H. Bradley Troost of the Mankato Clinic to Miss Betty Todd of Saint Paul. The wedding will take place early this winter.

* * *

Dr. L. J. Monson of Hendricks, Minnesota, was married July 27, 1935, to Miss Eunice Johnson of Saint Paul. Dr. Monson is the son of Mrs. Martin Monson of Canby, Minnesota.

* * *

The Federal Relief was discontinued in Blue Earth County the first of August. The County Society has been doing the county work. The County Board will unquestionably appoint a county physician to do the work in the future.

* * *

Dr. J. T. Schlesselman and Dr. A. V. Denman of Mankato are leaving this month for Canada to hunt big game. Dr. Albert Fritsche of New Ulm and Mr. Harry Pribnow of the National Citizens Bank, Mankato, are going with them. On these trips moving pictures figure very largely.

* * *

Dr. Henri Coutard, chief of the department of roentgentherapy of cancer at the Curie Institute, University of Paris, France, will deliver the twelfth Lewis Linn McArthur lecture of the Frank Billings Foundation of the Institute of Medicine of Chicago in the theater of the Chicago Woman's Club, 72 East Eleventh Street, at eight o'clock on Tuesday evening, October 1. The subject of his illustrated lecture will be "The Conception of Periodicity as a Possible Directing Factor in the Roentgentherapy of Cancer."

* * *

The fourteenth edition of the American Medical Association Directory is in preparation. Its value depends largely on its accuracy and members of the American Medical Association particularly are urged to submit their data promptly when requested. It is often of distinct advantage to members not to allow their membership in county societies to lapse and to young practitioners not to delay joining their local county societies, as such membership shown in the American Medical Association Directory might well be instrumental in receiving appointments with industrial firms, insurance companies, railroads and the like.

* * *

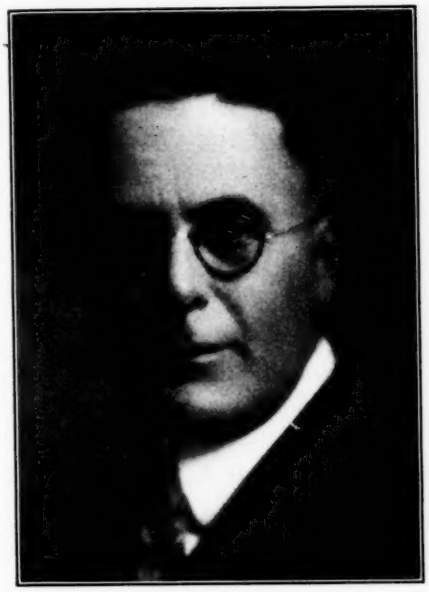
Typhoid in Minnesota.—The incidence of typhoid fever which reached mild epidemic proportions in and about Minneapolis this summer has apparently come to an end. Since the first week in July the number of cases showing first symptoms has rapidly fallen off and it can be safely said that the epidemic is over. Only four new cases with first symptoms beginning in August had been reported in Minneapolis up to the 20th of the month. Two of these were contact cases. Only one new case with onset of symptoms in August had been reported in Saint Paul up to the 20th.

The dissemination of cases throughout the state was noteworthy. Since the first of May, when the epidemic began, to August 20, 171 cases were reported in Minneapolis; twenty-six in Saint Paul; twenty-one in Duluth, and forty-five scattered throughout the state, a good number of these in the environs of Minneapolis. About six deaths have been reported thus far. The water supply of Minneapolis is still blamed as the source of the fever.

STAPHYLOCOCCUS TOXOID

Both favorable and unfavorable results of the use of staphylococcus toxoid in treating chronic staphylococcic infections have been experienced. On the basis of the available evidence one brand of this product was recently accepted by the Council on Pharmacy and Chemistry. The administration of staphylococcus toxoid to patients with chronic staphylococcic infections usually produces a rise in the titer of circulating antitoxin. This rise fails to occur by treatment with vaccines—the only other specific method. According to recent reports (D. S. Murray: Staphylococcus Toxoid, Lancet, 1:303, Feb. 9, 1935; C. E. Dolman, Staphylococcus Toxoid, ibid, 1:306, Feb. 9, 1935) the rise is associated with a measurable improvement in the chronic localized staphylococcic infection. Failures have been reported but these occurred chiefly in cases of acne; in addition, the questions of the specificity of the strains of staphylococcus employed in making the toxoid, and the potency of the preparations used, must be considered. To date, the best results have been recorded with recurrent boils and the least successful with acne.—(J. A. M. A., April 20, 1935, p. 1421.)

In Memoriam



Charles Naumann McCloud

1873-1935

Dr. McCloud, eldest son of David Hance and Marie (Naumann) McCloud, was born February 9, 1872, in St. Paul, Minnesota. His mother was born in Germany and his father at Philadelphia. His death occurred at the Miller Hospital, St. Paul, August 13, 1935, from tularemia, the result of infection by a wood-tick received while on a week-end fishing trip at Danbury, Wisconsin.

Dr. McCloud's early education was received at the old Webster school; following this he attended Macalester College, from which he was graduated in 1890. He then entered the employ of W. A. Frost & Company, druggists, where he remained for two years. In order to fit himself more adequately for what he then deemed his future profession, he matriculated in the School of Pharmacy at the University of Minnesota, receiving therefrom the degree of Doctor of Pharmacy in 1895. He then returned to his former occupation. His ambition, long cherished, toward the medical profession culminated in his entrance into the School of Medicine, University of Minnesota, from which he received the degree of M.D. in 1901. His internship was served at the City and County Hospital, St. Paul, 1901-1902. The conscientious and faithful service he gave while a resident brought to him appointment as Assistant City and County Physician during 1902-1903, after which he entered general practice, later to become the beloved physician of a large and devoted clientele. In 1903 Dr. McCloud was elected Medical Referee of the Minnesota Mutual Life Insurance Company. In 1908 he was advanced to Medical Director. In 1929 he was elected second vice-president and in 1934 he was made vice-president of the company. He retired from active practice in 1933 to devote his full time to his new duties.

Dr. McCloud was a member of the Ramsey County Medical Society and was its president in 1920; the Minnesota State Medical Association, the American Medical Association, and the Minnesota Academy of Medicine, of which he was president in 1929. He was also a member of the Association of Life Insurance Medical Directors and of the American Life Conventions, and has served as chairman of its medical section. He was a staff member of the Miller and St. Luke's Hospitals in St. Paul, a member of the Masonic order, the St. Paul Athletic Club, Nu Sigma Nu and Theta Delta Chi.

Dr. McCloud married Agatha deLambert of St. Paul October 18, 1904. They had two sons. The elder, David M., is a graduate of Harvard University, holding the degrees of B.A. and LL.B. He is now engaged in the practice of law at Dallas, Texas. The younger, Charles Naumann, Jr., was graduated from Princeton with the degree of B.A. in 1934, and will enter the Medical School of the University of Minnesota this year.

Gentle, unassuming, sympathetic, "Naum" McCloud, a devoted lover of the right, a scholar whom wisdom did not make arrogant, courteous, and generous to a fault, his genial companionship, his loyal devotion to family and friends, endeared him to everyone with whom he came in contact. His life is an inspiration and his memory a benediction.

Edwin H. Smith

Dr. Edwin H. Smith, health officer of Bemidji, died July 7, 1935, from pneumonia at the age of fifty-nine.

Dr. Smith had practiced in Bemidji for thirty-four years. He was a member of the Northern Minnesota Medical Association and the Upper Mississippi Medical Society, as well as the Minnesota State Medical Association. He served for fourteen years on the Board of Education in Bemidji, several terms as president of the Board and for several years was chairman of the Christmas Seal sale in Beltrami County. He was also a Mason and a Knight Templar.

Dr. Smith is survived by his widow and two sons, Gordon Smith of Bemidji and John Smith of Grand Forks, N. D., and two brothers, Dr. Clayton M. Smith of Elk River and E. B. Smith of Minneapolis.

MEDICAL ECONOMICS

The High Schools Debate State Medicine

When a public question makes its appearance along with disarmament, government ownership of utilities and other such old standbys on the high school debating platform, it is presumably no novelty in the popular consciousness.

It was therefore with some astonishment that physicians learned last winter that sickness insurance and state medicine, pro and con, were to join the perennial debaters' themes. Certainly sickness insurance and state medicine do not constitute a vital question in the lay mind over most of the United States.

The question was chosen by representatives of thirty or forty coöperating members of the National University Extension Association. It is said to have been before the committee for several years.

In any case, requests are already pouring into each state medical office and to the officers of the Bureau of Medical Economics of the American Medical Association for material on the subject.

Affirmative Has Specious Appeal

The question as stated by the Association is as follows:

"Resolved: That the several states should promote a system of complete medical care to be available to all the people at public expense."

Unfortunately, the affirmative in this case is quite likely to make an appeal to young debaters who are full of humanitarian ideals and without any practical experience in life whatever. Also popular magazines and the voluminous material published by the Committee on Costs of Medical Care will provide a wealth of material, most of which is specious but plausible.

It is obviously the duty of the representatives of organized medicine which has taken its stand as unalterably opposed to the provision of "medical care for all the people at public expense," to provide the best possible material for the assistance of those who will defend the negative in this proposition.

It is to be hoped that more good than harm will come out of these debates, if both sides of the question are given a fair and exhaustive investigation by the debaters.

Material Available

A "Handbook of Sickness Insurance, State Medicine and the Cost of Medical Care," which has been prepared by Dr. Leland and his Bureau of the American Medical Association, contains a wealth of information in the form of digests, negative and affirmative, from a variety of authorities and from students in this country and in the European countries where sickness insurance is already in operation.

This handbook and a varied selection of other material, including some that is of special interest to Minnesota, and a bibliography are available for the use of debaters at the office of the Minnesota State Medical Association, 11 West Summit Avenue, Saint Paul.

This material will be kept up-to-date and it should be the business of every member of the association to find out if any of his local high school teams are to debate on this subject and to tell them about this material.

Local Aid

Many of these young debaters will turn to their family doctors or the secretaries of their local county medical societies for assistance.

It is of the utmost importance to the future of medical practice in the United States that this assistance should be given promptly and in good measure.

Furthermore, medical men should make it a point to hear these debates whenever it is possible. They will afford an excellent opportunity to gage the trend of thought on this subject among students and their teachers.

Nor should the Women's Auxiliary be overlooked as a source of aid to the debaters. In every community where there is an organized auxiliary the women might well make it a part of their business this year to consult with the schools, offer their assistance and keep in touch with the debates.

Sickness Insurance is Huge Octopus---C. W. Mayo

Much of the medical testimony on the virtues and vices of European systems of sickness insurance date back a year or two—some of them even more.

The impressions of Dr. C. W. Mayo of Rochester, recently printed in the Staff Proceedings of the Mayo Clinic, on the other hand, are especially interesting and important because they reflect conditions as they are today in England, Germany, Austria and Hungary.

Excerpts are printed below for their timely interest to every physician who is concerned about the mounting propaganda for sickness insurance in the United States. It is hoped that copies may be made available for the use of the high school debaters on the subject.

Says Dr. Mayo:

"Individual impressions are not to be misconstrued as facts. What one person sees in one light, another person sees in a totally different light. On my visit to Europe I attempted to be unbiased, to learn not to go about with a smug feeling of statisfaction that America leads the world.

"It is not without a feeling of awe that a doctor visits such great countries as Italy, Hungary, Austria, Germany and England, for from all of them at various times have come epochal advances in both medicine and surgery, vitally important to the present high standard of the art and science of the practice.

Private Patient is Rare

"As to the present state of the field of medicine in these countries, it was my feeling that it was rather seriously affected by the political and financial unrest, may I call it, which I found evident, although in varying degrees, in practically all of the places I visited. The causes of this unrest need not be accounted for here, but the results of this unrest, as it has affected the care of the sick, the field of research, and the mental and financial status of the average doctor, were of intense interest to me.

"You are all to some extent familiar with the continually growing sickness insurance plan which is compulsory in most continental countries. Where it exists, it has become like a huge octopus, involving in its tentacles all professions, businesses, laboring trades, and government departments, each of which seems to have its own headquarters for insurance. For instance, in most places the Waiters' Insurance Company was very strong, and a waiter needing medical attention was well taken care of. He is required to contribute a percentage of his salary to secure this benefit.

"Many doctors are employed by the various insurance companies, and at ridiculously low salaries, but most of them will accept a low but sure salary because the private patient is comparatively rare, except to the older and well-known doctor. The private patient in most cases is one who has been advised by his insurance doctor to follow a certain line of treatment and goes to a private doctor for confirmation and perhaps for treatment.

Real Talent Buried

"In Budapest I visited one of the buildings which houses a large insurance company. It was crowded; thousands passed through it each day. There they paid in their weekly money, reported for relief money, were treated for minor conditions, or, if sick, came for diagnosis and advice. Time, perhaps, will smooth out many of the rough spots in health insurance as practiced abroad. It appears to offer much and to be sound theoretically, with socialistic tendencies. Actually, it is not as practical as it seems, either to the beneficiary or to the doctor on whom the burden rests; real talent has been buried in positions requiring none. Physicians trained in medical or surgical specialties too frequently hold down posts which keep them so busy with trivial duties and red tape that they do not have the time or the courage, even if the facilities were available (which they are not), to advance in either the art or the science of medicine.

"There are, of course, men here and there who are exceptions to the rule and who, despite the handicaps of lack of financial aid and lack of modern equipment, are accomplishing problems worthy of record. Among them may be mentioned Bence of Budapest and his study of pigs after gastrectomy. He has produced what appears to be true pernicious anemia, which develops in these animals, not the first, but the second year, after total gastrectomy.

Research at Low Ebb

"Suffice it to say, as far as medical research is concerned, that at present it is generally at a low ebb, and the reason for this is apparent. It is not from lack of interest of those concerned, but rather from factors which are, we hope only temporarily, out of the control of those concerned.

"The attitude of mind of the younger doctor par-

ticularly appears to be filled with uncertainty, not with uncertainty as to whether he wants to be a doctor, but rather uncertainty of opportunity. This was particularly true in Austria and Hungary, where, despite much reduced territory, a large number of men and women are still being educated in medicine, a proportion far above that actually needed for the population. Men, even though talented, cannot long live and work productively without a sense of security, and security at present is well-nigh impossible."

SERA

> Beginning August 1, only five days are to be allowed to elapse between the date of authorization for medical care and the writing of the relief order to pay for the service rendered.

The above order was issued from SERA headquarters August 2.

It means that obstetrical cases cannot be authorized prior to confinement.

Prenatal care may be authorized, but only in terms of the five-day interim.

A series of doctors' visits cannot be authorized in advance of more than five days and prior authorization for services or care not performed up to August 1 were cancelled on that date. New requests for authorization in accordance with the new ruling were to be made on and after that date.

An exception is made in case of emergency, though in this case, if the doctor has not secured written authorization first, his request will be granted or not according to the discretion of the worker.

Allotment Reduced

"Washington is reducing its allotment for human relief in Minnesota (as in the rest of the country)," says Mr. Benjamin E. Youngdahl, director of Social Service, in explanation of the new ruling. "We must keep our county offices in such a commitment position as to make it possible to liquidate those offices at almost any time in case funds are cut off."

Drastic reduction in relief funds has already been made in many quarters.

Those who were cut off from federal relief have promptly become charges on their local poor boards and county agencies. All physicians should keep in constant touch with the relief situation in their own communities and be ready to make adequate and fairly compensated arrangements with their local authorities for medical care of these people.

Optical Code

The fee schedule for refraction and spectacles for relief patients is as follows, according to a recent bulletin from SERA headquarters:

Refractions	$3.00
With mydriatic drops	$3.50

Materials used are to be billed at cost. The quality is especially designated: the price of frames not to exceed $1.25 and the lenses $1.50 unless very specially authorized.

Thus, when the doctor presents the relief order to the relief office for payment he must attach to the order a copy of the prescription covering the glasses ordered and on the reverse side he must itemize his bill as follows:

Refraction	$3.00
Lenses	1.50
Frame	1.25
Total	$5.75

If a client qualifies for these services under the spirit of the emergency program he may be directed to an optician or to an oculist for an examination. The doctor will be paid for the refraction whether or not he prescribes glasses. If he finds that glasses are necessary he will prescribe according to his findings and have the prescription filled in accordance with the materials specified by a reputable house.

Medical Care for WPA Workers

All employees of the Works Program Administration (WPA) will receive compensation for disability or death resulting from injuries sustained in the performance of duty; also medical and hospital care for such injuries, regardless of whether or not they result in disability or death.

This provision was included in the Emergency Relief Appropriation Act of 1935.

Administration of these benefits will rest with the United States Employees Compensation Commission which was established in 1916 to administer compensation and disability benefits to all federal civil service employees under the Federal Employees Compensation Act of that year.

The benefits extended under the Emergency Relief Appropriation Act of 1935 are subject to special limitations and conditions.

Note the following:

1. To warrant payment of disability or death benefits or payment for medical or hospital services, the employee *must have been injured in the performance of duty.*

2. The total aggregate compensation to be paid to any individual cannot exceed $3,500.

3. The monthly compensation shall not, in any event, exceed $25 a month.

4. There are to be no minimum limits on amounts of compensation or monthly payments such as there are for federal civil service employes under the Act of 1916.

None of the above limitations applies to employees on the administration or supervisory payroll but only to employees receiving so-called "security payments," that is, wages from the appropriations.

Supersedes SERA Division

The Safety and Compensation Division of the SERA which is providing medical and hospital service for relief worker employees on projects now being terminated to make way for the WPA will be superseded by local representatives of the United States Employees Compensation Commission.

Where, formerly, funds to pay for medical care for injured relief workers were derived from a revolving fund composed of money set aside from each month's relief appropriations within the state, they will come from a national appropriation for the WPA workers and are therefore on a much more assured basis.

Regulations

Treatment must be furnished in United State medical establishments wherever practicable.

In locations where these facilities are not available, the State Compensation Officer or his local representative will make arrangements for medical care by reputable private physicians.

Only qualified, licensed doctors of medicine are eligible for this work.

The cases will be distributed as equitably as possible among these physicians. A cumulative list must be kept by local representatives of the commission so as to show the number of cases referred to each physician.

Fees will be paid direct to the physician from the Commission in rates that are "not in excess of the minimum charge prevailing in the community for similar services."

Hospital Service

Hospitals will be paid in accordance with a fee schedule agreed upon with the National Hospital Association.

The physician authorized to treat the injured employee may designate the hospital where the injured employee is to be sent provided the hospital accepts the agreed upon rates.

The attending physician may also engage special nursing service upon his own authorization where such service is absolutely necessary.

Authority for treatment or hospitalization must be issued and signed personally by the proper issuing officer.

Delayed Relief Bills

Physicians who are treating relief clients, under the program now being terminated, should submit all their bills promptly with the proper authorizations. Furthermore, they should report any undue delay in receiving payment to their councilors and to the State Office.

Complaints made at the Annual Meeting at Minneapolis of excessive delays in receiving payment for service to relief clients were taken up by Secretary E. A. Meyerding with Mr. L. P. Zimmerman, acting administrator of the SERA.

Mr. Zimmerman assured Dr. Meyerding by letter that funds were available and that physicians would receive payment for approved services.

"Undoubtedly," he said, "the routine of auditing invoices, together with delay in receiving same, is the reason for delay. However, we are making a special case of this matter and will see to it that medical bills are paid at the earliest date possible. I appreciate your calling this to my attention and would ask you to kindly keep me notified regarding it."

The complaint was also referred by Mr. Zimmerman to Mr. C. H. Zealand, director of the Division of Safety and Compensation, who noted that a change in accounting procedure had caused an unavoidable delay for a time in payment of medical bills under the SERA self-insurance plan.

Physicians Are Slow

Mr. Zealand's greatest difficulty has been, however, to persuade the attending physicians themselves to submit their bills.

"If you have any information on specific instances of delay we would appreciate receiving particulars so that we may trace and remedy the situation complained of. It is possible the criticism has reference to medical expenses incurred in connection with the rehabilitative program rather than on account of the work of this division. This we could ascertain on receipt of more detailed information.

"At this time we wish to express our sincere appreciation to the State Medical Society for the wonderful coöperation we have received."

For Public Health

As this issue goes to press, the annual appropriation of $8,000,000 for promotion of public health programs to the states under the Social Security Act and the supervision of the United States Public Health Service is a virtual certainty. Funds held up at this session will undoubtedly be provided in January.

What will this federal appropriation mean for Minnesota?

To sum it up informally, it will mean that considerable sums of money can be secured from the federal government for a variety of public health projects that were formerly impossible for lack of funds.

These projects must meet with the approval of the United States Public Health Service. The United States Public Health Service must also be shown that adequate facilities and personnel are available and already organized for the task first. Furthermore, the state must match, dollar for dollar, a large part of the federal funds to be expended.

Training Necessary

Theoretically these funds become available as soon as they are made available by Congress. It is obvious, however, that much organization and considerable training of personnel to meet the requirements will be necessary before even the best organized of states can expect to make use of the funds.

It is obvious, also, that this is the time to lay a sound foundation for this organization and training. This is the time for conscientious, careful and thoroughgoing coöperation with the state health officer and his departmeint to the end that the new program—with all its possibilities for good—shall not, instead, unalterably fix upon us unfair practices, lowered professional standards and irremediable damage to public welfare in Minnesota.

Coöperation with Physicians

It was for the express purpose of asking for advice and assistance and for promising the cooperation of his department that Dr. A. J. Chesley, state health officer, appeared before the Council, and, later, before the House of Delegates in Minneapolis.

There seems to be no doubt, whatever, that Dr. Chesley and his department will work honestly and wholeheartedly with the medical profession to build a sound and satisfactory program in Minnesota.

In return, Dr. Chesley has the assurance from the Council that he will have more than nominal assistance from the profession.

It has been the reputation of physicians in the past—sometimes deserved—that they waited, inactive, until others have made the plans and formed the working policies. Then they became loud in their belated complaints.

There is no reason why the medical profession should lay itself open to such criticism in the matter of the new public health program in Minnesota.

Hospitalization by County Boards

The object of the act passed by the 1935 Legislature "authorizing County Boards to provide for hospitalization of the indigent in such counties" was to make it definite and clear that County Boards are not obliged to hospitalize their indigent in the University Hospital.

It applies to the County Board of any county in the state, whether the county has operated under the county, town or permit plan of caring for its indigent.

The above is a résumé of an opinion on the matter by F. Manley Brist, attorney for the state medical association, given in response to questions that have been raised in several counties operating on the town plan.

It is Mr. Brist's opinion that the bill was written to apply to all counties without exception

and it is his belief that that was the intention of its framers. He notes, however, that this act does not apply to those cases in which hospitalization is not necessary. Payment for medical and surgical attention that is furnished outside the hospital is the responsibility of Town Boards in counties where care of the indigent is under the town system.

The matter should be referred by local authorities to the Attorney General for a ruling if there is any question, in order that there may be a uniform application of the law.

Distribution of Physicians

There were 574 persons for every physician in the United States in 1886 and in 1931 there were 785 persons for every physician.

This is according to the best figures available, provided in the long awaited study of the distribution of physicians of the United States, recently published by Dr. R. G. Leland, director of the American Medical Association's Bureau of Medical Economics.

Apparently, as Dr. Leland indicates in his comment, these figures would indicate that the number of physicians in relation to population, when a term of 45 years is considered, is decreasing instead of increasing. They do not tell the whole story, however.

During four different two year periods there was a rapid increase in the number with a conspicuous decrease in the rate of growth in most of the intervening periods. It is difficult to tell whether, at the present moment, there is a movement toward a larger percentage of physicians per population or the reverse.

Young Men in the Cities

Thus the statisticians hesitate as yet to uphold the thesis of many physicians and economists, that there is a conspicuous over-supply of physicians.

Here are other interesting facts developed in this study.

There are more than two and one-half times as many people for each physician in communities of less than 5,000 population than there are in cities of 100,000 or over. These figures bear out the repeated observations that physicians tend to congregate in the large centers. The fact that most of the physicians practicing in the large centers are young men with the ages of thirty to thirty-four predominating indicates that it is the young men just graduated from medical school who are going to the cities rather than that there is a movement of established physicians from the smaller to the larger centers.

There is a noticeable difference of distribution between the various states and this difference appears to depend somewhat on the presence of persons having a sufficiently large income to bring them within the scope of the federal income tax.

The percentage of physicians calling themselves specialists is only 16.5 per cent of the total number over the whole United States.

This percentage rises to approximately 25 per cent of all the practicing physicians in some of the larger centers. It is not large, however, compared with Germany, where the percentage in fifty-two cities over 100,000 population is 46.6, and in forty-nine cities from 50,000 to 100,000 is 50.7 per cent.

The number of physicians who graduate and enter practice each year in the United States is approximately 4,000. The number who die, according to the best available figure, is close to 3,500.

There are many interesting phases of this study that cannot be touched upon here. It will repay careful reading and study.

Minnesota State Board of Medical Examiners

Saint Paul Abortionist Receives Four-Year Prison Sentence

State of Minn. vs. Peter H. Nellessen
State of Minn. vs. Constance Lundgren
State of Minn. vs. Harold Wayne
State of Minn. vs. Robert Wallace.

Peter H. Nellessen, 1100 Hand avenue, Saint Paul, sixty-four years of age, married and the father of six children, received a sentence of four years at hard labor in the State Prison at Stillwater, on July 25, 1935, following his entering a plea of guilty to an information charging him with the crime of abortion. Nellessen was sentenced by the Hon. R. A. Walsh, Judge of the District Court for Ramsey County.

Nellessen, whose only medical training consists of eight years as a male nurse at the Soldiers' Home at Minnehaha Falls some thirty-five years ago, had been

engaged in the performing of criminal abortions, according to his own statement, over a period of the past forty years. He admitted having operated at Ashland, Wisconsin, Minneapolis and Saint Paul. He stated that he performed about one hundred abortions during the past year. His arrest followed the discovery of a grave in the back yard of a home at 527 Edmund Street, Saint Paul. It was at this home that Nellessen had performed an abortion upon a sixteen year old Saint Paul girl. Nellessen also admitted having supplied and sold to women such articles as pessaries, suppositories, et cetera. He was addressed as "Doctor" although his conversation and appearance would have indicated to an ordinary person anything but that.

The Lundgren woman, together with the other two defendants, was charged with concealing the birth of a stillborn child. The three were sentenced to ninety days each in the Saint Paul Workhouse. This sentence was suspended and they were placed on probation in charge of the probation officer. They cooperated with the authorities in apprehending Nellessen.

The Minnesota State Board of Medical Examiners coöperated with Mr. M. F. Kinkead, County Attorney of Ramsey County, and James F. Lynch, his assistant, in the handling of these cases.

List of Physicians Licensed by the Minnesota State Board of Medical Examiners on July 6, 1935

June Examination

By Examination

Adams, Marvin Edward, U. of Minn., M.B., 1934, Minneapolis.
Anderson, Edward Marvin, U. of Minn., M.B., 1934, Sleepy Eye, Minn.
Anderson, Oliver Wendell, U. of Minn., M.B., 1935, Minneapolis.
Baker, Russell Lowell, U. of Minn., M.B., 1934, Hayfield, Minn.
Barr, Robert Neff, U. of Minn., M.B., 1929; M.D., 1930, Minneapolis.
Bergh, George Sverdrup, U. of Minn., M.B., 1932; M.D., 1933, Minneapolis.
Black, Earl James, Loyola U., M.D., 1934, St. Paul.
Brotchner, Robert Jacob, U. of Minn., M.B., 1935, Saint Paul.
Brown, James Wellington, U. of Minn., M.B., 1935, Minneapolis.
Burch, Edward Parris, II, Johns Hopkins U., M.D., 1933, Baltimore, Md.
Clagett, Oscar Theron, U. of Colo., M.D., 1933, Rochester, Minn.
Darden, William Howard, Duke Univ., M.D., 1932, Northport, Ala.
Eiler, John, U. of Minn., M.B., 1935, Minneapolis.
Ellinger, George Frederick, U. of Minn., M.B., 1934, Minneapolis.
Evans, Leslie Mathew, Marquette U., M.D., 1935, Saint Paul.
Grandy, A. Margaret, U. of Minn., M.B., 1934, Minneapolis.
Hanssen, Egil, U. of Minn., M.B., 1933; M.D., 1934, Minneapolis.
Harlowe, Harold Douglas, U. of Minn., M.B., 1934, Wilmette, Ill.
Havel, Thomas Earl, Creighton U., M.D., 1935, Montgomery, Minn.
Helferty, John Kenneth, Rush Med. Col., M.D., 1934, Tracy, Minn.
Holmberg, Conrad Joel, Rush Med. Col., M.D., 1935, Ortonville, Minn.
Johnson, Malcolm Rossland, U. of Minn., M.B., 1935, Minneapolis.
Katz, Louis Jack, U. of Minn., M.B., 1934, Saint Paul.
Kaufman, Herschel J., U. of Minn., M.B., 1934, Minneapolis.
Kozberg, Oscar, U. of Minn., M.B., 1934, Saint Paul.
Lenarz, Albert Joseph, Marquette U., M.D., 1935, Albany, Minn.
Lohmann, John George, U. of Minn., M.B., 1934, Minneapolis.
Modelevsky, Aaron, U. of Minn., M.B., 1934, Saint Paul.
Moses, R. Rounce, U. of Minn., M.B., 1934, Northfield, Minn.
Nelson, Harlan Forest, U. of Minn., M.B., 1935, Brooten, Minn.
Paulson, Donald Lowell, U. of Minn., M.B., 1935, Saint Paul.
Rozendaal, Hendrik Marinus, U. of Leyden, Netherlands, 1928, Rochester, Minn.
Secord, Eugene William, Yale U., M.D., 1932, Rochester, Minn.
Sibley, William Langley, U. of Virginia, M.D., 1930, Rochester, Minn.
Sjostrom, Lawrence E., U. of Minn., M.B., 1935, Minneapolis.
Spang, Anthony Jennings, Marquette U., M.D., 1935, Duluth, Minn.
Strathern, Carleton Schleuder, U. of Minn., M.B., 1935, Minneapolis.
Vandersluis, Charles Wilson, U. of Minn., M.B., 1934; M.D., 1935, Bemidji, Minn.
Wasson, Loren Francis, U. of Minn., M.B., 1935, Minneapolis.
Williams, Mervyn Morrill, U. of Minn., M.B., 1934, Marshall, Minn.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

STATED MEETING HELD MAY 2, 1935

The President, DR. MARTIN NORDLAND, in the Chair

TETANUS*

A Study with Analysis and Report of Thirty-three Cases

Charles E. Merkert, M.D.

Although the average medical practitioner is rarely called upon to treat a case of tetanus, he is nevertheless mindful of this disease in planning his care of the ever-increasing number of traumatic injuries. All of us should be interested, therefore, in an analysis of a group of tetanus cases—particularly a group from our own locality—for one can never know when a serious case of this disease may complicate even a minor laceration under treatment.

The prevention and treatment of tetanus was given major consideration in the care of the wounded during the World War. So important was it considered, that special tetanus commissions were appointed to study the problem. The experience during the war emphasized the importance of intelligent primary wound care with débridement (removal of sequestra and damaged tissues) with primary or delayed primary suture, and also the value of prophylactic injection of antitoxin in single and repeated doses.

That the above measures were of decided value in greatly reducing the incidence and mortality of tetanus in the war wounded was definitely shown by the reports of Bruce[6] and Golla[8] of the British Tetanus Commission, as well as by the reports of the Medical Corps of our own Expeditionary Forces.

Our greatest opportunity to lower the incidence and mortality of tetanus in civil practice seems to depend upon how well we carry on with those preventive measures established as a routine of surgical procedure during the war.

Undoubtedly better wound care and more widespread use of prophylactic antitoxin has resulted from the knowledge gained during this period, and is today a major factor in reducing the number of cases in our own city and state. The mortality records of the Health Department indicate that in Minneapolis and the State of Minnesota, during the period of ten years from 1923 to 1933, the rate of death per 100,000 population due to tetanus is somewhat lower than that of the whole United States registration area. Statistical information on the true incidence of tetanus in this city and state cannot be secured, and only an estimate can be arrived at by realizing that the deaths represent the greater proportion of cases.

The material used in this survey of tetanus was obtained from the records of the Minneapolis General Hospital and the Minnesota General Hospital. It consists of the cases of tetanus during ten years at both institutions up to January 1933. (Not consecutive years at the Minnesota General Hospital.)

It was found that thirty-three cases could be collected, all of which were general tetanus. No cases of only local tetanus could be found. These cases do not represent city injuries only, as many were sent in from throughout the state.

CHART I. TETANUS MORTALITY FIGURES FOR TEN YEARS (CITY AND STATE)

Death Rates Per 100,000 Population
From Division of Public Health (Minneapolis, Minnesota)

Year	Minneapolis Deaths	Minneapolis Rate	Minnesota Deaths	Minnesota Rate	Rate United States
1923	6	1.47	37	1.5	1.7
1924	4	.95	23	.9	1.6
1925	2	.47	25	1.0	1.5
1926	5	1.15	27	1.1	1.3
1927	5	1.13	21	.8	1.3
1928	1	.21	28	1.1	1.3
1929	4	.87	28	1.1	1.2
1930	4	.86	22	.9	1.1
1931	4	.84	24	.9	.9
1932	8	1.66	22	.8	.9
Average	4.3	.95	25.7	1.01	1.28

Mortality.—Of these cases, twenty-one patients died, giving a gross mortality rate of 63.6 per cent. Taylor[23] in a series of thirty-seven cases at the Indianapolis City Hospital and Indiana State Hospital showed a mortality rate of 54 per cent. Bruce's[6] 1,458 cases during the World War showed a mortality rate of 34.8 per cent. However, practically all of his cases had received prophylactic serum. Stone[21] reported seventy-two cases at the Los Angeles General Hospital which showed a mortality rate of 52.7 per cent. Yodh[26] in the *British Medical Journal* reported a series of 102 cases treated with antitoxin intravenously, intraspinally, and intramuscularly with a 64 per cent mortality. A later series of his treated by intrathecal administration of antitoxin into the cysterna magna (112 cases) showed a mortality of 46.5 per cent.

As can be seen, the mortality rate is still very high and many factors such as age of patients, prophylaxis, severity of the disease and manner of treatment must influence the rate in different series.

Age Incidence.—The ages in this series ranged from four to fifty-four years. The average age was twenty-one. I have often heard it said that the prognosis of tetanus in children is especially unfavorable. In the twelve cases under twelve years of age, the mortality rate was 50 per cent. In the twenty-one cases of twelve years or over, the rate was 71.4 per cent. I do not know how to account for this, as the treatment in both groups was similar.

Sex.—There were twenty-six males and seven females. The greater exposure to traumatic injuries of the male can well account for this.

*Inaugural thesis.

Incubation Period and Relation to Mortality Rate.—In thirty-one cases in which it could be determined, the incubation period varied from four to ninety-four days. Twenty had incubation periods of from five to nine days. The day of greatest incidence was the sixth. Bruce[6] in his series found the most frequent day the ninth. He also found the mortality rate varied inversely with incubation period length. This series does not definitely show this trend, as can be seen by the chart.

CHART II. INCUBATION PERIOD AND RELATION TO MORTALITY

Day	Cases	Number Lived	Number Died
4	1	0	1
5	3	0	3
6	6	2	4
7	4	2	2
8	4	2	2
9	4	1	3
10	0	0	0
11	0	0	0
12	1	0	1
13	1	1	0
14	1	0	1
16	1	1	0
17	1	1	0
19	1	0	1
20	1	1	0
61	1	0	1
94	1	0	1

Type of Causal Injury.—In some cases the history was meager in regard to the responsible injury. They are as follows:

8 Penetrating wounds of feet by nails or rake
4 Glass lacerations of hands or feet
3 Wood sliver or splinter wounds
2 Abortions
2 Compound fractures
1 each: Manure spreader laceration, laceration of hand on corn shredder, laceration of head by horse's kick, blister on heel, gunpowder burn, nose cut on ash can, finger chopped by axe, frozen fingers, hand in wringer, injury to toe, laceration of ear, and bowel resection for obstruction due to appendiceal abscess.

Of the two cases without history of injury, one patient had broncho-pneumonia.

Contamination by manure and farm dirt can be inferred in many of these injuries. The penetrating character of many of these wounds is noticeable. Taylor in his recently reported series noted the large number of patients who had sequestra in wounds. This series, aside from the wood splinters, does not show this.

Prophylaxis History.—Only one patient in the group received a true prophylactic injection of 1,500 units of antitoxin the day of injury. In that case the incubation period was ninety-four days. One received a prophylactic injection four days after injury and had an incubation period of seventeen days and lived. These two cases demonstrate the usual effect of prophylaxis on the incubation period, as mentioned by Bruce. One patient received antitoxin a week after injury and developed tetanus seven days later. This patient died from what was called anaphylactic shock on being given 20,000 units intravenously the day tetanus developed. None of the other patients received any antitoxin before the onset of symptoms.

Let me repeat that prophylactic antitoxin with good wound care is the most successful way to reduce the incidence and death rate from tetanus. As pointed out by war experience, in long-drawn-out, badly-infected wounds, prophylactic injections should be repeated each week until the wound is healed.[6] It is also advisable to give a prophylactic injection preceding the re-opening of any old infected wound.[6]

Period of Delay Before Treatment.—This varied from one to eight days—the average being 2.5 days. No definite relation of mortality rate to the length of this delay period can be determined.

Before attempting to evaluate the treatment used in this group of cases, it is my intention to discuss briefly my conception of tetanus and its treatment as derived from the literature.

In the second century, Aretæus[2] wrote of tetanus, "With them, then, who are overpowered by this disease I can merely sympathize. This is the great misfortune of the physician." Now let us see how far we have progressed from this.

Many recent authors doubt the value of antitoxin in the treatment of tetanus. The high mortality in most series bears this out. Irons, as quoted by Manson,[13] however, in comparative series with and without the use of antitoxin showed a 6 per cent higher mortality rate in the cases not given antitoxin. Sherrington's[10] experiments on monkeys injected with toxin indicate that antitoxin—particularly when given intravenously or intraspinally—was very effective in preventing death, which otherwise would always occur when no antitoxin was given. But Bruce,[6] from the larger number of cases at his disposal for study, could draw no conclusion as to the value of antitoxin as a curative agent.

The only alternative treatment is that of Bracelli,[15] and its modifications, in which phenol injections are used. Although it is an old treatment, it seems to have been used only on sporadic cases in this country. Bruce[6] states that it was tried in some British hospitals during the war, but did not seem at all effective. Huntington[11] states that Kitasato found it to be without value. It has been used principally by the Italians and, at least as reported by Pilloni[15] in 1931, is to be preferred to the antitoxin treatment. In fifty-three cases, in which the Bracelli treatment was used, his mortality rate was only 30 per cent. This treatment, he stated, was not effective in the fulminating type of case. He minimized the usual criticism of this treatment regarding the effect of phenol on the kidneys.

Savini[16] stated that Bracelli recommended as a daily adult dose 0.5 to 2 grams of phenol, and that continual observation of the urine for smokiness was the guide as to overdosage, which when observed should lead to cessation or material reduction of the dose or extension of the interval. Bryan[5] in Tennessee, at the Vanderbilt Hospital in 1933, reported his use of phenol (1 per cent aqueous solution) in six cases—with no deaths. He mentioned an article by Bracelli, writ-

ten in 1911, in which the author claimed to have suggested phenol treatment before Behring and Kitasato had undertaken the development of antitoxic serum in 1890. He stated also that Bracelli reported a large series of cases treated with phenol with a surprisingly low mortality rate.

Bates[3] in 1932 reported five cases treated with antitoxin intraspinally and intramuscularly, combined with phenol injections subcutaneously. There was only one death in his cases. Suvansa[22] in 1931 reported fourteen cases treated by intrathecal injection of phenol (1/400 in normal salt solution). In this series there were ten recoveries and four deaths. He uses 12-20 c.c. in children of twelve, and 30-40 c.c. in adults. He stated that Bracelli recommended the administration of 10 c.c. of a 1 per cent solution intramuscularly every two hours, but says that this has not been successful in other hands.

One can conclude from the foregoing that phenol treatment should receive more attention generally, and particularly by those who are convinced that antitoxin is without value. I believe, however, that most of us are not as yet convinced that antitoxin should be discarded in the active treatment of tetanus. Experimental evidence and the superb results of its use in prophylaxis make one hesitate to discard so promising an agent. Much discussion has been presented as to the relative merits of the various routes of its administration. Greater or lesser quantities of antitoxin have been advocated by many authors. The background for this is the objective of placing greater concentration of the antitoxic substance in position to neutralize all of the toxin possible and particularly to protect the central nervous system from toxin in lethal amounts. Our success in this endeavor is only determined by the mortality figures in actual cases. However, there are many obstacles as well as possibilities in accomplishing our purpose that can best be made clear by presenting some of the physiological as well as experimental factors in the problem.

In the first place, it is known that most deaths in tetanus are due to neuro-muscular contractions produced by the action of tetanus toxin affixed to the motor nuclear cells of the spinal cord and medulla.[11] It is also true that, with recovery, permanent damage to this nerve tissue usually does not occur.[11] The problem, then, is to keep the patient alive and he will get well. The toxin, as we know, is an exotoxin produced by an anaërobic spore-forming bacillus (clostridium tetani), first recognized by Necolaier in 1884. Abel[1] recently stated that, assuming the sensitivity of man to be equal to that of the monkey, he hazards the calculation that it would require only 0.01 mgm. of the really pure poison to kill a man weighing 150 pounds. From the infected wound, the toxin is thrown out into the surrounding tissue fluids and into the bloodstream.

From the tissue fluids about the wound, as well as from most other tissue fluids to which it has been carried by the bloodstream, it is generally believed that the toxin is picked up in some manner by the nerve trunks and carried to the central nervous system. Meyer and Ransom, and Marie and Morax,[17,24] believed that the toxin was carried by the axis cylinders of the nerves, but the more tenable theory, as elaborated by Gumprecht and Robertson,[17] is that perineural and intraneural lymphatics carry the toxin centrally. The early appearance of trismus in general tetanus can be explained on the basis of the comparatively short distance the toxin must travel up the motor trunk of the trigeminal nerve.[21] Experimental work indicated that in sensory nerves the lymphatics are blocked at the posterior root nuclei and this could account for the lack of tetanus dolorosa (painful tetanus).[24]

It is also believed that the toxin is transmitted up the spinal cord toward the brain along intraspinal lymphatics.[17] Most authors believe little if any toxin reaches the brain or cord directly through the arterial circulation. However, Abel[1] and his co-workers at Johns Hopkins in 1934, from an experiment (sectioning the sciatic nerve, but with careful resuture of the severed parts so that continuity of the perineural sheath was restored, followed by injection of toxin into the nerve) concludes from this and other data that toxin is not carried up the nerves or their lymphatics and that the only conclusion they can come to is that it is carried to the central nervous system by the arteries. Only a few have found toxin in the spinal fluid, Robertson,[16] Manson[12] and most others having repeatedly found the spinal fluid free of toxin.

The toxin delivered to the brain and cord, as mentioned heretofore, becomes firmly fixed to the tissue and is believed by most authors to be irremovable by antitoxin. It is this last factor that is our greatest obstacle in successful antitoxin treatment, for often by the time a case is diagnosed enough toxin has already become attached to produce the fatal muscular contractions. This being true, our greatest hope of saving such patient is by sedation directed towards the involved nerve tissue and our greater attention is directed to this part of treatment.

It would seem, however, in spite of the amount of the fixed toxin, that an attempt to neutralize the as yet unfixed toxin as well as to shut off the continuation of supply from the focus is a logical procedure. This presents problems.

Let us divide the toxin present in an active case of tetanus into four portions:

1. That already fixed to the cells of the brain and cord.
2. That in general tissue fluids in most lymphatics, and in the bloodstream.
3. That in transit along the main nerve trunks and along the lymphatics of the cord (accepted by most authors).
4. That portion most recently elaborated by the focus and as yet in the wound and immediate vicinity of the wound.

It would seem that whatever success is derived from antitoxin treatment comes from the neutralization of the last three portions of the toxin. The second portion (in bloodstream and tissue fluids) has been proven

to be neutralized by all of the various routes of administration of antitoxin. The intravenous route should be the quickest and most effective way to accomplish this, although the most dangerous from the standpoint of anaphylaxis.

The third portion (in transit in nerve trunks, et cetera) is potentially the most dangerous of the free toxin, as it is well on its way to fixation. It also appears to be in a protected position from the antitoxin placed in the blood and general tissue fluids. Whatever antitoxin travels up the same route (and some experimental evidence casts doubt that any does) can be of small value in neutralizing the toxin on the way. Permins' experiments in animals indicate that intraspinal injection of antitoxin does prevent the onset of local tetanus.

Some authors indicate their belief that the spinal canal is a closed cavity and in no way could antitoxin get from it directly to the nerve tissue or lymphatics of the nerve roots or cord, and that this route has been used on account of its mere propinquity to the spinal cord.[5,25] It occurred to me that spinal anesthesia—and particularly the regional localization possible with spinal anesthesia—very clearly refutes this idea. That the variation in physical properties of the procaine and antitoxin molecules may result in the ability of one to approach and enter the cord or nerve roots and the other to be excluded, is conceded. However, definite proof that antitoxin cannot travel from the spinal fluid to the cord or nerve trunks as does procaine seems lacking.

Huntington[11] suggests that possibly intraspinal antitoxin causes a non-specific inflammation of the nerve roots with a resulting blockage of the lymphatics which prevents the flow of toxin to the central nervous system. Whatever the mechanism, it seems that intraspinal antitoxin might be of greatest value against this third portion of toxin. Greater concentration of antitoxin injected into the cysterna magna, as advocated by Yodh,[26] by this reasoning would seem of value to protect the more vital centers.

Taylor,[23] however, in discussing the recent paper of Miller and Rogers, states that he is glad to hear the authors voice their protest against intrathecal administration. Some authors have criticised intrathecal antitoxin administration on account of the meningeal irritation produced.[23] Wainwright[25] stated that intraspinal injections are harmful, increase mortality, and should be abolished. Robertson[16] recently stated, in answer to my question as to whether or not he had found from his studies basis for advocacy of intraspinal antitoxin, "I have never, under any circumstances or in any manner advocated intraspinal injections of antitoxin; quite the opposite, as a matter of fact, because repeatedly I have stated that it seemed a waste of valuable therapeutic effort." He also stated that many outstanding authorities are of a different opinion. "The proof," he also said, "is not an easy one to elicit in a sufficiently strong manner to settle the matter definitely." However, Bruce[6] advocated intraspinal therapy over intravenous—particularly on account of the danger of anaphylaxis in the latter.

The fourth portion of toxin can best be taken care of by injection of antitoxin about the wound and in conjunction with this, by adequate wound care with excision or wide incision and removal of necrotic tissue and sequestra. In the recent Indiana series, Taylor[23] particularly stressed the value of even opening healed wounds and also commented on the large number of concealed sequestra found where wound opening was done routinely. He also noted the rapid improvement after sequestration in some of the cases. In his discussion of the paper by Miller and Rogers,[16] he stated that all tetanus cases should enter the hospital by way of the operation room and that here the local wound should be excised if possible; if not, it should be thoroughly explored and a débridement done —even on healed skin lesions.

Other factors in the mechanism of tetanus, such as metabolic disturbances and studies of the neuromuscular phenomena, have a bearing on treatment.

Huntington[11] states that Krinzki found a fall of 30-50 per cent in the calcium content of the serum during the course of tetanus and remarked that this needs further study. Yodh[26] in his series used calcium in all cases from the start as a preventive for serum reactions, believing that the small number of reactions encountered was due to this.

Heim[10] noted first a rise, then a lowering, of sodium content of the serum in tetanus. In 1929 he stated that as a result of motor spinal center irritation, due to tetanus toxin, the resultant muscular contractions produce lactic acid, and, as Meyerhof revealed, an increase in hydrogen ion concentration in the muscles. To this he attributes the severity of the continued muscular contracture. For this reason he administered sodium bicarbonate to his cases. He gives 20 to 50 c.c. of 10 per cent solution intravenously and 10 to 30 grams by mouth. He stated that the result was surprising. Within fifteen to thirty minutes he noted some muscular relaxation reaching a climax usually in one hour, then gradually disappearing, giving way to the former condition in three to five hours. On daily administration, the effect was increased in intensity and duration. In nine cases in children using this treatment along with antitoxin and other sedation, he had two deaths.

In contrast to the above is the following work gathered by Huntington.[11] Observations by Shizaka indicate that tetanus contracture seems to maintain itself without undue expenditure of energy, the muscle actually accumulating glycogen, showing a low metabolism. This, he states, would seem to indicate that some profound alteration in the muscle in contracture must have taken place. Liljestrand and Magnus showed that in early tetanus the muscular stiffness can be abolished by novocaine, the spinal reflexes remaining present. Ranson's work showed, however, that, after contracture had been present for a day or so, neither novocaine nor trans-section of the posterior nerve roots will abolish it and Ranson concluded that tetanus toxin is a general poison to the nervous system. Huntington cited evidence demonstrating that both experimentally and clinically no action current could be found in

CHART III. FULMINATING CASES

Case	Age	Period	Antitox.	Most Antitoxin	Type of Death	Remarks
L. S.	6	7	66,000	Is.	Convulsive	
A. K.	12	6	11,000	Iv.	Prob. toxic	Wood sequestrum removed.
R. W.	11	14?	20,000	Iv.	Anaphylactic	1500 U serum 8 days previous.
T. W.	6	6	41,500	Is.	Convulsive	1500 U serum to wound area.
G. W.	41	?	90,000	Iv.	Convulsive	No history of injury. Had bronchial pneumonia.
R. M.	52	19	130,000	Iv.	Convulsive	Frozen fingers.
E. G.	24	7	none	..	Convulsive	Died on first attempt to insert rectal tube.
R. C.	32	5	none in H.	..	Convulsive	10,000 U serum day before admission to hospital.
I. J.	30	8	31,000	Iv.	Respiratory	20,000 U was given during 4 days before admission, Im.

CHART IV. PATIENTS THAT DIED BUT RECEIVED ANTITOXIN AT HOSPITAL ON AT LEAST TWO DAYS

Case	Age	Incub. Period	Days Lived	Hosp. Days	Antitox. 2 Days	Most A. T.	Remarks
W. S.	14	4	4	2	60,000	Iv.	Convulsive death.
J. S.	54	12	4	2	185,000	Iv.	Necrotic tissue removed from wound. Positive skin test. Had serum rash.
J. S.	41	9	8	3	95,000	Iv.	5000 U about wound.
J. M.	28	8	10	8	200,000	Iv.	Avertin used.
A. L.	4	5	4	3	80,000	Im.	30,000 Iv., 10,000 Is., 40,000 Im.
A. P.	30	9	7	4	60,000	Iv.	Avertin used, also Mg. Sulph. Im.
I. S.	22	5?	5	4	110,000	Iv.	Scab removed from wound. Dichloramine.
G. R.	34	9?	2	4	15,000	Iv.	Had proph. 1500 U day of injury. Cpd. fracture. Probably anaphylaxis.
M. E.	12	6	2	8	180,000	Is.	Cpd. fracture.
R. W.	5	6	3	2	133,000	Is.	3000 U about wound area.
M.D.	11	61	4	2	210,000	Iv.	
C. S.	38	9	3	3	30,000	Iv. & Is.	Wound incised and iodine applied.

tetanus contracture, differing from decerebrate rigidity in which these currents are always found. Other workers agree but show that when such a muscle is stretched, or a convulsion occurs, currents can be demonstrated. Huntington states that it might be thought that muscle contracture in tetanus could be explained by interference to the upper motor neurones, but that then the specific affinities of toxin for certain centers and the phenomena of local tetanus become very difficult to explain. Ranson showed microscopic changes in the sarcoplasm of muscles under contracture for several days, which he believed to be specific. He was unable to demonstrate any change in the lactic acid content. Melzner was not able to relax muscle contracture in mice with three to four times the lethal dose of curare. With others of the same mice he was able to produce more complete relaxation with non-lethal doses of avertin.

With the above discussion in mind, let us attempt to appraise the treatment in this series—first in regard to antitoxin.

It must be stated at once that no evaluation of the advantage of any particular route can be made from this series, as practically all were treated by combined intravenous, intraspinal, and intramuscular routes.

For the purpose of analysis, I have arbitrarily divided the series into groups. The patients in the first group lived long enough to receive antitoxin on only one day at the hospital, or died before any could be given. In this group are nine cases. They died mainly in convulsive seizures. One patient died from anaphylactic shock. These patients received from none to 130,000 units of antitoxin before death. The average amount given was 44,400 units. In this group it would seem that larger doses of antitoxin could not have favorably affected the result. The use of greater sedation to prevent fatal muscular spasms and convulsions and also routine preliminary testing to prevent anaphylaxis possibly might have prevented some of these fatalities.

The rest of the cases are divided into two groups —patients who lived, and patients who died. I have determined in each case in both groups the amounts of antitoxin received during the first two days of treatment, as it would seem that on these amounts of antitoxin administered during this period one can best evaluate its efficacy in treatment rather than on the total amount received—for the patients who lived naturally received *in toto* more antitoxin because they lived longer

As the chart shows, the twelve patients who died received from 15,000 to 210,000 units in the first two days, the average being 113,000 units. The twelve patients who lived received from 35,000 units to 240,000 units of antitoxin in the first two days, with an average amount of 107,000 units.

The only conclusion that I can draw from these figures is that I can see no optimal dosage of antitoxin to obtain good results. I also cannot see any advantage in the more heroic dosages with the present antitoxin.

In both of these groups the route used for the largest portions of antitoxin was by vein in the majority of cases. Where the largest amount was given intraspinally, the results were not more favorable and vice versa. The difficulty in appraising the value of antitoxin is apparent. Certainly, without its use the mortality rate would have been higher. Fixed toxin prob-

CHART V. PATIENTS THAT LIVED

Case	Age	Incub. Period	Hosp. Days	Antitox. 2 Days	Most A. T.	Remarks
E. B.	8	16	14	140,000	Iv.	
F. H.	8	8	14	80,000	Iv.	
A. A.	45	13?	37	171,000	Iv.	Followed resection of black obstructed bowel. Old append. abscess. P. O. ileus.
C. P.	10	6	23	130,000	Is.	
C. O.	8	6	30	35,000	Iv.	Wound opened. 5,000 U. about wound.
V. A.	30	7	86	125,000	Is.	5,000 U. about wound. Developed peripheral neuritis.
H. P.	10	?	25	35,000	Iv.	No history of injury.
G. W.	19	8	28	58,000	Iv.	Wound excised and 5,000 U. about area.
L. M.	4	20?	13	45,000	Iv.	5,000 U. about wound.
L. D.	12	7?	32	130,000	Iv.	Encephalitis symptoms long after recovery.
H. G.	30	17	62	80,000	Is.	Amputation hand for gas bacillus day before onset. Proph. 1,500 U. 4th day.
E. M.	14	9	29	240.000	Iv.	Wound incised. Had serum rash.

ably accounts for its failure in such a large percentage of cases.

Turning from the serum treatment, I wish to briefly discuss the sedatives and anesthetics used in this series. A great variety of these agents were used. In the earlier years chloral hydrate by rectum and by mouth was favored and appeared only fairly effective. Morphine was occasionally used. Magnesium sulphate intramuscularly, intravenously and intraspinally was moderately employed, and luminal and bromides used slightly. In the cases in later years, avertin and sodium amytal have been used. One can see no startling change in mortality rate when these last two were employed, although many authors have recently reported very favorably on their use in occasional cases.

Avertin, first used as an anesthetic by Eichholz,[11] has been very successfully used in brain surgery by Dandy[7] at Johns Hopkins. He reported its employment in upward of 250 major cranial operations without mortality due to the anesthetic, no instance of postoperative pneumonia, and no deleterious effect either immediate or remote. Avertin, he states, is not foolproof but is safe if used with good judgment. He has used avertin as a basal anesthetic, supplementing it where necessary with other agents such as ether and local anesthetics. He used usually 90 to 95 mgms. per kilo of body weight, and rarely more than 100 mgms. per kilo. Harmsen and Higgens[9] in Missouri in 1934 reported four patients with tetanus treated with antitoxin and avertin, of whom three lived and one died. Huntington records eleven cases reported in Germany and one case of his own in which avertin was used. Eight of the twelve lived. He used in his case 60 to 89 mgms. per kilo twice daily. He believes one must use enough to control convulsions and not merely to slightly quiet the patient. As he states, "One wants as an ideal symptomatic treatment, not a hypnotic, but a suitable anesthetic. The ideal one should have a protracted effect. It also should be rapidly and completely eliminated. The barbiturates lack this last property. Avertin seems the best sedative at the present time." In March, 1935, Boyce and McFetridge[4] of New Orleans reported forty cases of tetanus treated with avertin and antitoxin at the Charity Hospital with fourteen deaths, a mortality rate of only 41.6 per cent. Of fifteen cases treated personally by these authors in the last two years, using a routine treatment in which avertin and antitoxin were employed, only five died, a mortality of 33.3 per cent The chief dangers in the use of avertin appear to be reduction in blood pressure. Dandy[7] does not advise use of ephedrine, if this occurs. Occasional hepatic and renal damage has been noted.

In 1931, Smith and Call[10] in Indiana reported very satisfactory control of convulsions in tetanus by fairly large doses of sodium amytal by vein and by mouth. They used it on four cases in conjunction with antitoxin with uniformly good results.

The doses of the various anesthetics and sedatives are of great importance, and, as mentioned, should be sufficient to control the convulsions if possible. This is an individual problem in each case. The doses of these varied greatly in this series and the records were not clear as to the degree of sedation and the effect on the muscular phenomena. It is my opinion that in the treatment of tetanus greater study of anesthetics and sedatives is necessary.

Aside from drug sedatives, the general measures such as quiet surroundings, darkened room, general supportive treatment were carried out in this series and are of importance.

Last but not least in value is the care to the wound. In seven patients the wound was opened after tetanus developed. Four lived and three died. No large number of sequestra were found as in the Indiana series.[23] Some healed wounds were not touched and possibly they should have been opened and drained. In one case the onset and prompt cessation of tetanus symptoms came the day after the amputation of a badly-infected hand that contained a gas bacillus infection as well as tetanus, demonstrating the value of the total removal of the focus of the toxin production.

Injections of antitoxin about the wound were recorded in four patients who lived, and in three who died. To me this seems to show the value of this procedure and indicates that it should be used routinely where possible.

I feel that I cannot conclude this paper without at least mentioning one phase of tetanus study that has received much attention, as judged by the literature, during the last few years. I refer to the work in the production of various types of tetanus toxoid and its possibilities for use in immunization against tetanus.

Conclusions

1. Tetanus deaths are best prevented at the time of injury by suitable wound care and use of prophylactic antitoxin.
2. Tetanus death rate in Minneapolis and Minnesota over a ten-year period is somewhat lower than the rate for the whole United States.
3. Acute general tetanus does not respond to treatment very well and has a large mortality rate (63.6 per cent in this series).
4. The phenol treatment possibly should receive more attention.
5. The use of antitoxin should not be abandoned, but more heroic doses do not seem indicated, and the best route of administration (not determinable by this series) is the intravenous.
6. More adequate sedation should be given and further study of anesthetics and sedatives is needed to prevent convulsive deaths.
7. Injection of antitoxin about the wound and adequate wound care after tetanus develops are important and valuable in the treatment of tetanus.

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Discussion

DR. KENNETH BULKLEY: I wish to congratulate the essayist for his excellent presentation. As far as my recollection goes, the subject of tetanus has not previously been presented to this organization. I wish further to congratulate the Minneapolis Surgical Society for having had the opportunity to hear this paper and for having elected to its membership an individual capable of producing work of this character. I sincerely trust it will not be his last effort.

Despite the fact that the subject has been covered quite thoroughly, there are certain points which I would like to emphasize and a few others which I would like to mention which, if my recollection is correct, were not brought out in this paper. Tetanus is prevalent the world over, certainly in all inhabited communities. It is, as you know, a common inhabitant of the intestinal tract of many animals and is not uncommonly an inhabitant of the human intestinal tract. A study made in Chicago in 1932 showed that about one per cent of otherwise normal individuals, as far as urbanites were concerned, harbored tetanus bacilli, and a considerably higher proportion of suburbanites. In this country it is generally thought to be more prevalent in the Hudson Valley region of New York State and in Long Island, New York, than elsewhere, and it is generally conceded that it is more prevalent along the Atlantic seaboard than elsewhere. Tetanus is not going to disappear despite any future effort of preventive medicine. The spores are the most resistant known. Active bacilli have been grown from a dry nail which eighteen years previously had been dipped into a tetanus culture. The spores have been known to survive boiling for an hour and to have survived immersion for fifteen hours in five per cent phenol.

Many other points of entry other than those listed tonight have been described. It has developed following many different clean operative procedures; it has been reported following the insertion of a Steiman nail in a simple fracture; it has developed secondary to flea bites; it has followed the bad habit of "nose picking"; it has been reported following the careless trimming of toe-nails. There has been much discussion in the literature as to whether the development of tetanus following a so-called clean operative procedure cannot be ascribed to spore-bearing catgut. The probabilities are, however, that contamination in these cases, particularly in a herniotomy, is from skin and not from catgut.

As far as treatment is concerned, I still feel that our sole reliance should be placed upon tetanus antitoxin, although it has always been somewhat questionable in my mind as to whether the extremes of dosage are justified. I believe the highest dose reported in the literature is that given to an eighteen year old boy in Cardiff, Wales, who had as extensive tetanus as one could imagine. He ran a high temperature for over six weeks following a nail wound of the foot, and received, in all, 1,800,000 units of tetanus antitoxin with recovery. Personally, I feel that the antitoxin should be given by the three recognized routes, appreciating fully, however, that there has been much written, particularly recently, against its intraspinal use. I have had no experience with the use of carbolic acid in tetanus but agree with the essayist that the favorable reports in the literature made by men who have used it extensively certainly justify further study of its use. Following severe convulsions in tetanus the patient not infrequently goes into a state of apnea which, at times, is permanent. I would suggest that under such conditions artificial respiration be used inasmuch as there are in the literature a number of reports of individuals not only temporarily thus kept alive but eventually recovering.

I would also emphasize the point made by the essayist as to the general treatment of these cases, in the avoidance of all external stimulæ. Commonly minor stimulæ such as turning down a sheet, turning on an electric light or the clicking of a door-knob can throw these patients into a convulsion. In children I believe it wise to use a little inhalation chloroform before each injection even though only subcutaneous. The essayist tonight mentioned, but I believe only rather casually, the use of magnesium sulphate in the treatment of tetanus. Dr. S. J. Meltzer of New York advocated in 1899 the use of magnesium sulphate as an anesthetic. In 1906 Dr. Jos. A. Blake, having utilized magnesium sulphate for anesthesia in humans, decided to utilize it in a case of tetanus and, with your permission, I am going to read you his description of this case.

"The patient, a boy fifteen years of age, weighing 115 pounds, was admitted on November 3, 1905, with the following history. Nine days before admission he had crushed off the ends of the first three fingers of the left hand. Two days before admission he began to have stiffness of the jaw and neck, and could not open his mouth. He also complained of pain in the back of the neck. The initial symptoms consequently developed seven days after the injury.

"On the day of admission, the jaws could be separated for three-quarters of an inch; the sternomastoids were prominent and in spasm; flexion and extension of the neck were not painful; lateral motion was painful and limited. The following day there was little increase in the symptoms. That morning Dr. Walton Martin, under nitrous oxide ether anesthesia, dressed the fingers by curetting and cutting off necrotic fragments of tissue and swabbing them with tincture of iodine. At the same time he injected into the spinal cord, introducing the needle between the fourth and fifth cervical vertebræ, forty cubic centimeters of tetanus antitoxin, and an additional twenty cubic centimeters into the median cephalic vein. That night the temperature rose to 102°, there was increased stiffness of the neck, the jaws could not be separated so widely, and spasm of the vertebral muscles developed. There was a marked urticarial rash. Twenty cubic centimeters more of antitoxin were injected into the median basilic vein.

"On November 5, the day following, the rigidity of the jaws and neck had increased; risus sardonicus was present; there were commencing spasms of the muscles of the legs and well-marked opisthotonos. That afternoon, thirty-five cubic centimeters of antitoxin were injected into the spinal canal by lumbar puncture. The same night his temperature reached 104.4°.

"On November 6, the second day following the first injection of antitoxin, there was marked, almost constant, opisthotonos, but the contraction of the masseters had not increased. The temperature during this day was high, between 103° and 104°, the pulse between 104 and 112, and the patient was evidently feeling the strain of the severe pain and

almost constant convulsions. In twenty-four hours, twenty-four minims of Magendie's solution had been required.

"His condition being very grave, it was decided to try magnesium sulphate. At 12 noon, 4.5 c.c. of a solution of magnesium sulphate (25 in 100 of water) were injected by lumbar puncture—the usual amount for producing anesthesia. Two and three quarter hours after the injection, the patient was stuporous; the spasm of the neck was lessened; the opisthotonos was gone; there was no response to pricking of any part of the body and extremities; pricking of the face seemed to produce pain; the legs were paralyzed.

"Six hours after the injection, the jaws could be opened wide; the stiffness of the neck and back had disappeared, sensation was present in face, trunk and legs; the arms and legs could be moved slightly; there was no pain, and the temperature had fallen to 102.6°, the pulse to 104; the respirations were 14. The patient seemed drowsy, but took nourishment well, swallowing without difficulty. Nine hours after the injection, the temperature rose to 104°, but responded to an alcohol sponge, and fell during the next twenty-four hours to 101°.

"On November 7, the day following the injection, the tonic convulsions were absent until evening. During the day there were occasional clonic convulsions, but the patient was fairly comfortable, except for some pain in the back. At 9:00 p. m., thirty-three hours after the injection of the magnesium sulphate, its effects seemed to have entirely disappeared, the jaws and neck were rigid, there was constant opisthotonos, and the pupils were contracted. Accordingly, another injection of the same amount was made. In an hour he was more comfortable, the convulsions being less. In two and a half hours he was relaxed and asleep. Six hours after the injection, he could move his arms and legs; there were only occasional slight spasms. During the next day, November 8, there was a steady increase in the spasmodic contractions, yet they were not severe, and he passed a fairly comfortable day and night, taking his nourishment well. The temperature still remained high. By the morning of November 9, the opisthotonos had returned, there were frequent convulsive movements, marked rigidity of the jaw and neck muscles, and risus sardonicus. Lumbar puncture was done at 10:30 a. m., an interval of thirty-seven and a half hours having elapsed since the last injection. By advice of Dr. Meltzer, eight cubic centimeters of a 12.5 per cent solution of magnesium sulphate were injected. This injection was again followed by complete relaxation, the patient was drowsy and rested quietly, but was not stuporous. Five hours after the injection, the legs were paralyzed, but sensation was present. There was about the same rigidity of the jaw muscles. There was no pain unless he was moved. On this day the temperature fell to normal, but again rose, and continued between 100° and 101°. No rise of temperature followed this or the following injection. This injection held him well in hand until the next day, November 10, in the afternoon, when it again became necessary to give an injection. This was done at 3:30 p. m., twenty-nine hours having elapsed, and the 12.5 per cent solution was again used.

"Two hours later, the convulsions had disappeared, and he was resting quietly, without mental disturbance. As after the preceding injection, there was no loss of sensation in the legs, but they became paralyzed for several hours. On November 11, he was fairly comfortable; the convulsions were infrequent and slight. On November 12, the opisthotonos returned, but was not persistent, and on that day and the succeeding three days the symptoms were not severe, and he was kept comfortable with morphine and chloral.

On November 16, the sixteenth day of his disease, and the sixth day after the last injection of magnesium sulphate, the opisthotonos became more severe, and there was increased rigidity of the jaw muscles and considerable pain. Consequently it seemed wise to give him a fifth injection. The 12.5 per cent solution was used and was followed by marked relief. After that, although the convulsions returned, they were much less frequent and severe, and gradually disappeared, so that by December 1 he was practically well.

"During his illness the wound was dressed daily with weak iodine water. Rectal irrigations of several gallons were given twice daily, in order to increase elimination. Chloral and morphine were given in moderate doses when not under the effects of the magnesium sulphate.

"Five intraspinal injections were given without any injurious effect whatsoever. In fact, a certain amount of tolerance seemed to be established, for the later injections did not seem to have so much effect upon the sensory impulses and the cerebrum as the first, although the motor symptoms were practically the same after each injection.

"We are certainly justified in claiming the following points in its favor: 1. A marked effect in restraining the convulsions and relieving pain, thereby conserving strength and preventing excessive metabolism and heat production; 2. That the spasm of the muscles of mastication and deglutition is at least lessened, thereby permitting feeding; 3. That its action is continued for a considerable period (twenty-nine to thirty-seven hours) without depressing action upon the heart muscle; and finally, in one case at least, that repeated injections produced no harmful effect, except the inhibition of the bladder and the consequent need for catheterization."

In closing may I emphasize what the essayist has already said in regard to the treatment of tetanus, namely, that the best treatment for tetanus is prophylaxis, as so beautifully demonstrated by all nations in the last great war.

LT. COL. SHERWOOD (by invitation): I have nothing that I can add to what has been said. We have the unusual experience in the Army of very rarely seeing a case of tetanus because, as said by Dr. Bulkley, we give the prophylactic dose promptly. I rather think Major O'Brien has a few figures he can give you with reference to our methods of prophylaxis.

MAJOR THEO. W. O'BRIEN (by invitation): Mr. President, essayist and members of the Minneapolis Surgical Society, I have enjoyed the essayist's excellent presentation of his subject. I have been stationed at Fort Snelling, Minnesota, four and one-half years, during which time we have used the prophylactic dose of antitetanic serum whenever indicated in the treatment of wounds. We average thirty-five to fifty prophylactic injections a year in our small 100 bed Station Hospital.

During 1934, 2,360 patients were admitted to the hospital, one-half being surgical cases and one-fourth being eye, ear, nose and throat cases. Throughout the State, in the CCC Camps during 1934, there were 20,000 admissions to sick report. Based on our figures, probably one-half of them were surgical cases. The exact number of prophylactic antitetanic injections is not known at this time as the figures are compiled by the Surgeon General.

During 1933, there were 1,700 admissions to the Station Hospital with fifty prophylactice injections or an average of about one a week. Throughout the state, admissions to CCC sick report were 8,000. We have had no cases of tetanus, but we are heartily in favor of prophylactic treatment.

I have not seen a case of tetanus since the World War. However, this evening Colonel J. W. Sherwood told me of a case he had seen in San Antonio, Texas, during 1926, which developed within twenty-four hours following a compound fracture of a leg, sustained during a polo game. Even though an immediate debridement, reduction, and prophylactic antitetanic serum were used, crepitus developed within twenty-four hours and a pure culture of tetanus was obtained. However, with additional drainage, antitetanic and gas serum, the patient recovered.

DR. J. F. CORBETT: I was glad that Dr. Bulkley brought into the "lime-light" the question of the use of magnesium sulphate. This seems like a very important adjunct. Of course, it is not curative but it relieves the spasms.

It was my fortune to have to administer this form of therapy quite a large number of times during the years when tetanus was more prevalent than it is now. The procedure was first to get the patient under chloroform, that would give relaxation, and then we could

do a spinal puncture, introducing the magnesium sulphate very readily. Without chloroform it was almost impossible to do it. The dose was 1 c.c. of 25 per cent solution for each 10 kilos of weight, and to repeat them as often as indicated. In one case where I used this adjunct the respirations became slow and I assumed it was due to the magnesium sulphate. I let the fluid out and the patient improved, so I assume it was the magnesium sulphate.

The statement was made that there was no case of localized tetanus in the records. I recall a case: a boy had received a cut in the face and five days after that developed tetanus. At the time I was a full time man at the University and I did not treat any cases. Dr. Sweetser treated that case, and he recovered, as the prognosis of cephalic tetanus is rather good.

The records of the British Commission are rather exhaustive. One thing struck me with a great deal of force: in no case of five day tetanus where the prophylactic dose had been used for twenty-four hours did it do any good. That is, it must be used within the next few hours following the injury or it does no good.

DR. J. M. HAYES: During the war some of us were sent to Lyon, France, to visit the Clinic of General Berard. He had in the hospital at the time we were there, over thirty cases of tetanus. The French were grouping these cases at that time and perhaps that is one of the principal reasons why their mortality was lower than in other places, and especially since the war. Intraspinal injection of magnesium sulphate was their principal therapeutic measure for these cases. Not having seen this method before, we were not much impressed with it at the time, but later learned that he had a lower mortality than most centers of treatment for this condition. Others who were not so skilled in intraspinal therapeutics tried it but their results were not so good. It is a good illustration of the fact that one must be skilled in the intraspinal application of any drug in order to get the desired results. To get the best results with drugs of any kind intraspinally one must not only be able to get the drugs into the spinal canal with the least possible trauma and disturbance of surrounding tissue, but he must also know the contraindications and the untoward symptoms which may arise and be ready to treat them promptly and efficiently.

DR. WILLARD PETERSON: I can appreciate Dr. Merkert's paper the more because I know the time and effort he expended in its preparation. Rather than discuss so complete a paper I should like to report a case of tetanus which I treated and which recovered.

The case is that of a single white woman, age 38 years. Her family history was negative. In the past she had the usual childhood diseases. She had her appendix and tonsils removed about ten years ago. She also had been diagnosed and treated for ulcer of the stomach twelve years ago.

Her present history dates from two days before admission to the hospital. On that day she cut through the skin of the left hypothenar area on a printing or stamp pad. The first aid treatment consisted of merely bandaging. This cut remained tender and on the following day she noticed pain extending up to the elbow which caused her to apply hot packs to the hand and forearm up to the elbow. On the following morning, or forty-eight hours after the injury, she noticed the pain had extended into the left shoulder and left side of her neck.

I saw the patient first at noon on this same day, or about fifty hours after the injury. The findings at that time were definitely indicative of tetanus. The teeth were firmly clenched and could only be opened about one-half inch with difficulty, and only for a second before they closed again. The neck was rigid and any motion was very painful. The back was arched backward and there was bilateral carpo-pedal spasm.

The original site of injury was red and the edges everted, and there was considerable stiffness and pain in the entire left forearm and arm. The rest of the examination was negative. As the examination was completed she developed a convulsion similar to that seen in strychnine poisoning which lasted about thirty seconds, but she did not lose consciousness. About one hour later, as she was placed in the ambulance, she developed another similar convulsion.

When the patient arrived at the hospital the wound was cauterized and washed out with peroxide of hydrogen and she was given a small dose of antitetanus serum under the skin to test her sensitivity. As soon as it was definitely established that there was no reaction to the serum she was given 20,000 units of antitetanic serum intraspinally after removing the same volume of spinal fluid, and 10,000 units intravenously. Following this she complained of severe pain in her head, back and legs, and a sensation of tightness in her entire body.

At about 5:00 p. m., or two hours later, she became irrational and opisthotonos developed. The jaws became firmly set and a twitching of the fingers and toes developed. Morphine was given in ¼ grain doses which apparently caused some relaxation. The temperature was 101.2° and pulse 54.

The next day, October 14, 1932, she was semi-conscious all day. The pulse rate remained around 40 but of good quality. Her temperature did not exceed 99.8 rectally. She was very restless but the extreme extension of the feet, the rigidity of the jaws and neck remained constant. Under morphine the jaw would relax but any irritation around the mouth would cause instant closure. She was given 20,000 units of serum intravenously and 40,000 intraspinally. Later in the day she complained of inability to see and her hearing became diminished.

October 15. The severe pain in her head and back remained. The rigidity of her jaws was sufficiently less to enable her to ingest fluids. The head, however, remained in opisthotonos. She was given 40,000 units of serum intraspinally and 20,000 intravenously.

October 16. She was able now to open her mouth quite freely. She was again given 40,000 units intraspinally and 20,000 intravenously. The pulse rate increased to 60, and the temperature was 100 R. The vision and hearing improved slightly.

October 17. She was given 20,000 units of serum intravenously. The headache, backache, and opisthotonos remained but the head could be flexed onto the chest. The jaws could be opened. On this day she developed itching of the eyelids.

October 18. She was given 20,000 units of serum as the final dose. The mild itching of her body persisted. She was able, however, to move about in the bed without discomfort.

October 19. She developed urticaria of her hands and feet which caused a great deal of discomfort. A weakness of the right external rectus muscle developed and double vision left of the midline.

October 20. The urticaria became generalized, causing severe itching and discomfort.

October 21. The urticaria improved. Her temperature now was 98.2 by mouth, and the pulse around 90. She also had a slight chill followed by epigastric pain.

October 22. Food distress returned. The nervous symptoms had all disappeared with the exception of the eye signs and a numbness of the left hand.

October 23. Severe itching of the skin returned with edema of the eyelids and face. She also complained of a feeling of fullness in the throat.

October 24. Constantly improved.

October 29. Up in a chair.

October 31. Headache severe.

November 1. Condition satisfactory, to go home. Double vision still persists.

December 9. Vision normal.

DR. E. T. BELL: I would like to raise the practical question here as to when the prophylactic antitoxin is to be given. It must be only a very small percentage of wounds that develop tetanus, and all of the speakers have called attention to cases where tetanus followed very trivial wounds, splinters in the fingers, etc. If we had been asked in advance whether or not to give prophylactic antitoxin to these patients we probably would have advised against it. Children are continuously getting splinters in their fingers and cutting their feet—are you going to give all of them antitoxin or not? Would you give the prophylactic injection to an asthmatic child?

DR. CHARLES E. MERKERT: I wish to thank all of the doctors who have discussed my paper, and I want to assure them that I appreciate their consideration of my presentation and the interest shown in the subject, as evidenced by the number who have participated in the discussion.

In regard to the magnesium sulphate injection treatment, as mentioned by Drs. Bulkley and Hayes, as stated in my paper, it was used in this series intramuscularly and intravenously. In two cases it was used intraspinally and both of these patients died. There is one thing about the use of magnesium sulphate injections that is well to remember and that is that the antidote, if an overdose is given, is calcium chloride given by injection.

In reference to Dr. Bell's question as to when to give prophylactic antitoxin or not, I wish to say that I consider that to be a very important question, but one regarding which there is a variance of ideas and opinions. Pertinent to this question, I wish to say that in one of the recent medical journals a case was reported where a doctor was legally held liable for damages because he had not administered antitoxin in a case where tetanus developed. Personally, in some injury cases I explain to the patient the possibilities, however slight, of tetanus developing and leave to him the responsibility as to whether or not he wishes the use of antitoxin. However, in puncture wounds, compound fractures, and deep lacerations of all kinds, I advise its routine use. On the other hand, I learned some time ago from Dr. Thomas Lowe, who is here tonight, that in connection with injuries in the packing plants at South St. Paul they rarely give antitoxin, and I believe they have had but one tetanus case in all their injuries in the past fifteen years.

In regard to anaphylactic reactions resulting from prophylactic injections, Bruce mentioned that in two million injections given to the British troops there were eleven such reactions, with recovery in all cases.

In conclusion, I wish to present the routine of treatment as recommended by Boyce and McFetridge in their recent paper:

I. Excision of local wound when possible; otherwise debridement or wide incision and drainage.

II. Use of serum.
   (a) On admission, after usual sensitivity test, 20,000 units by vein, 20,000 units intramuscularly; 2,000 to 5,000 units about the wound.
   (b) 20,000 units intramuscularly on the second and third days.
   (c) 10,000 units intramuscularly seven days later. (Maximum dosage never over 100,000 units; minimum dosage never under 50,000 units; important for economic reasons.)

III. Use of avertin via rectum for control of spasms —80 to 100 mg. per kilo initial dose; smaller continued doses used before previous doses wear off.

IV. Nourishment by stomach tube, infusions and other general measures as indicated.

THE RATIONALE OF THE INJECTION TREATMENT OF HERNIA

Carl O. Rice, M.D.

In order to place the injection treatment of hernia into the hands of the ethical members of the medical profession the efficaciousness of the method must be established upon sound scientific principles as well as on clinical results. It therefore becomes our problem to demonstrate, histologically, the tissue reaction which takes place after the injection of the irritating solution.

Peculiarly, this method of treating hernia was employed as long ago as 1835 by Valpeau, who used iodine to produce the irritation. A few years later Heaton (1843) reported the cure of hernia by the injection of a solution, the nature of which he did not disclose. He continued to report good results. In 1877 he published a book which disclosed the nature of the solution which he had been using. However, about that time Halstad was beginning to make his name on the work he had done in perfecting an operation for the cure of rupture. He demonstrated that this was a very rational and effective operation which was by far superior to the numerous ligation, cautery and other fanciful methods in vogue at that time. No scientific rationale had been developed to explain the cure by the injection method. Perhaps for that reason the method fell into disrepute. For the past fifty years it has received no mention in the literature. At no time has the method been investigated from a scientific point of view. No histologic or pathologic studies have been made to explain the cures and for that reason the ethical members of the medical profession have rightfully rejected it as part of their armamentarium. However, it does not seem that they are to be entirely forgiven for not having made histologic investigations whereby the method could have proven or disproven its worth.

It has been my pleasure to have had the opportunity of making this investigation from the histologic standpoint. Dr. Hamline Mattson has collaborated with me in this work. Further work is being carried out in an effort to find a solution which will possess all of the attributes and none of the undesirable features which we have established as essential to perfect results. Reference shall be made first to our initial work, which was done on the human. After that the investigative work which I have done in the experimental laboratory at the University shall be considered.

In the hernia clinic at the Minneapolis General Hospital we saw patients who were uncertain as to whether they desired an operation or the injection treatment. Likewise we saw others who, after having received one or two injections, decided that they preferred an operation. We therefore took this opportunity to obtain biopsies and in order to obtain the sequence of histologic changes we secured their admission into the hospital at intervals so that we have obtained sections from 15 hours to 42 days after the injection of the irritating solution.

No difficulty was encountered in the operation as a result of the previous injections. In a few instances

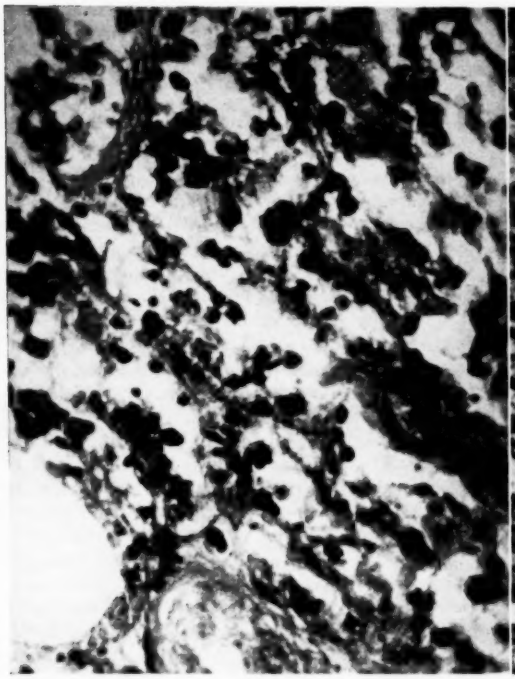

Fig. 1. Microphotograph from a section taken fifteen hours after the injection of the irritating solution. Polymorphonuclear cells, round cells and a few fixed connective cells. Magnification 800 X.

Fig. 2. Seven days after injection. Young fibroblasts and a few newly formed blood vessels predominate the picture. A few round cells, but only an occasional polymorphonuclear cell can be seen. Magnification 200 X.

where the patient had received three or four injections, the newly formed fibrous tissue made it somewhat more difficult to dissect the cord from the loose areolar tissue which surrounds it in the inguinal canal. In one instance in which the patient had had ten injections without having obtained a complete cure the scar tissue was similar to that which is observed at a second operation for hernia. This of course should not confound a surgeon. It has been mentioned, however, to indicate that strong, tough fibrous tissue is produced, for without the production of scar tissue it is very improbable that it would be possible to obtain a cure.

The histologic sections revealed the following findings:

At the end of fifteen hours the section showed an exudative reaction with polymorphonuclear cells and round cells. There was also some proliferation of the fixed connective tissue cells and some evidence of cellular necrosis (Fig. 1).

On the fifth day fibroblasts were seen with large dark staining nuclei. Polymorphonuclear cells were less evident but the round cells were still present.

On the eighth day the fibroblasts were more abundant and likewise appeared more mature. The intercellular fibers were beginning to make their appearance. Newly formed blood vessels were seen. An occasional polyblast was found (Fig. 2).

On the fourteenth day the fibrous tissue was found to lie in dense bundles. Fibroblasts seemed to have assumed more adult proportions. Their nuclei were smaller and the fibers more abundant. No polymorphonuclear cells could be found (Fig. 3).

On the eighteenth day most of the fibrous tissue appeared to be mature.

At the end of the forty-second day the tissue was dense and looked like adult fibrous tissue. The fibroblast nuclei were small and the fibers were abundant (Fig. 4).

Our initial work was done with phenol, alcohol and thuja as the irritants. This is evidently very caustic and cannot be given in more than four or five minim doses, without producing definite tissue necrosis. Theoretically this exudative and destructive phase of the inflammation could produce an abscess. It therefore seems desirable to use a solution which would produce less of the exudative reaction and still stimulate the production of fibrous tissue.

The ideal solution should be one which causes no pain when injected; it should be non-injurious to the tissues; it should produce no systemic reaction from its absorption; it should be non-toxic if inadvertently injected intravenously; produce no peritoneal inflammation if likewise injected in the peritoneal cavity and should produce a predominance of the proliferative phase of the inflammation with a minimum of the

Fig. 3. Fourteen days after injection. Young fibrous tissue with small, slender nuclei can be seen. Fibers are moderately abundant. An occasional round cell, but no polymorphonuclear cells can be seen. Magnification 200 X.

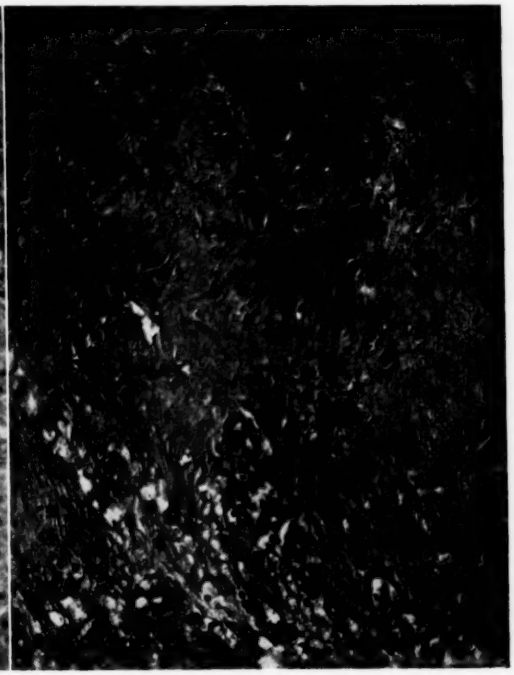

Fig. 4. Forty-two days after injection. Fibrous tissue is abundant. Fibers are wavy. At the right of the section the proliferation of fibrous tissue does not appear to have progressed as far as at the left side of the picture.

exudative phase. It should stimulate the production of fibroblasts whereby the defect can be filled with scar tissue.

In the experimental laboratory at the University I have injected a number of solutions into the rectus muscle of the dog in an effort to determine the comparative amounts of exudative reaction and the comparative amounts of fibroblastic stimulation.*

Those solutions containing phenol, tannic acid and other mineral acids produce the inflammatory reaction and eventuate in the production of scar tissue but they also cause tissue necrosis and an exudative reaction greater than that which seems necessary or desirable. The rationale of producing scar tissue by such a method, though effective, is not entirely sound.

A solution containing tannic acid, alcohol and a few other ingredients was injected intravenously into the dog. Immediately after the injection the dog staggered about on the floor for a few minutes and appeared sick. He recovered completely within fifteen minutes. Intraperitoneal injection produced pain. Twenty four hours later the small capillaries of the peritoneum appeared congested. There was a slight increase of the intraperitoneal fluid but no fibrinous exudate.

Sodium psylliate,* a soap, is a mild sodium salt of a fatty acid and seems to possess most of the desirable features. It produces the minimum amount of exudative reaction after its injection; it is practically painless when injected; it stimulates the growth of fibrous tissue; it produces no systemic reaction when injected as was so often observed after the injection of other solutions which contained tannic acid, alcohol or phenol. This solution was injected into the blood stream of the dog and no reaction was observed. After injecting it intraperitoneally in the dog it appeared that the animal experienced pain but within ten minutes his reaction seemed normal. Twenty-four hours later the peritoneal cavity was opened and no evidence of peritoneal inflammation could be found. This solution is somewhat similar to sodium ricinoleate and we know that that has been used in the peritoneal cavity of the human without harmful effects. Likewise sodium ricinoleate and sodium morrhuate have been injected intravenously in the treatment of varicose veins without harmful effects. The exudative reaction of these solutions when injected into the tissues may eventuate in an abscess.

In order to convey the idea that this method of treating hernia has now passed the experimental stage it might be well to state that it has been used at the

*This work has now been discontinued in favor of Dr. Arthur A. Nelson, who is working on this problem for a Master's Thesis in Pathology.

*Sylasol (G. D. Searle and Co.)

Minneapolis General Hospital for two and three-fourths years and at the University Hospital for about three and one-half years. At the Minneapolis General Hospital we have treated more than 600 cases.

A follow-up letter has been sent to 400 patients but the responses have been proving very unsatisfactory. Perhaps that is to be expected with this type of transient charity case. However, in those cases which we have been able to check at quarterly intervals we have found very few recurrences and I know of only two cases which we have referred into the hospital because we felt incapable of producing a cure by the injection method.

We have had two cases of chemical peritonitis. This followed the injection of a solution of quercus alba. This solution is not recommended for the treatment because of its severe and caustic reaction. We have also observed a number of cases of induration of the cord but this condition has subsided without complications. It was produced after the injection of different ones of the more caustic solutions. This condition has not been observed in a single instance in which sylasol has been used.

I have heard of other complications such as peritonitis, cellulitis, perirectal abscesses and thrombosis of the inferior epigastric artery with gangrene of the skin. Dr. Lawrence Larson and I are making an investigation of these cases but it is my opinion that these complications have developed not as a fault of the method but as a fault of the technic.

Conclusions

From this bit of investigative work it seems that the rationale of the injection treatment for hernia can be established upon sound scientific principles. The production of fibrous tissue at the site of the defect is the mechanism by which the hernia is cured but the production of scar tissue through the destruction of normal tissue as may occur after the injection of strong caustic solutions, although effective, does not seem to be the final word in the choice of a satisfactory solution.

A solution of a mild soap (sylasol) seems to have fulfilled the requirements to greatest advantage. Clinically it has proven to be effective and histologically the sections reveal the minimum amount of exudative reaction and tissue necrosis with a predominance of the proliferative phase.

In view of these findings it is recommended that, in suitable cases, the injection treatment of hernia be added to our surgical armamentarium where surgery is contraindicated and in those individuals who prefer not to have an operation for the cure of their rupture.

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Discussion

DR. A. F. BRATRUD: I have listened to Dr. Rice's presentation on this subject with a great deal of interest and am sure that everybody has the same feeling.

Drs. Fraser and Hall in 1929 did some experimental work using the original pina mestre solution, at the New York University and Bellevue Hospital. Their work was carried out principally on monkeys and dogs. Their results showed edema and swelling in about ten days. Examination of the indurated areas showed a vigorous proliferation of endothelial and connective tissue cells, plus large mononuclear phagocytes and foreign body giant cells. They did not feel that there was any danger of these areas forming any malignant neoplasm later on.

A great number of dogs and rabbits were injected at the University, using various types of solution. The thuja mixture produced the greatest amount of proliferation. Various mixtures with tannic acid from 1 per cent up to 5 per cent were used. These produced a very active proliferation of fibroblastic tissues, with no necrosis. When these solutions were tried on patients they had to be combined with local anesthetics, so as to diminish the burning sensation which resulted. For this, nupercain and novocain were used.

When a synthetic tannin preparation was used on patients, a number would complain of symptoms resembling an acute coryza on the following day. This was taken up with a pharmaceutical chemist, who gave the opinion that this resulted from the fact that there was more rapid absorption from synthetic preparations than when tannin existed in colloidal form. Pina mestre solution was used, both the original mixtures and a preparation put out by a drug firm in this country. Necrosis resulted in tissue injected with the preparation which was put up in this country, according to the pina mestre formula. A distillate of vegetable tinctures supposedly contained in the pina mestre solution was used, and this produced practically identical tissue reaction as the original pina mestre solution. This shows a fibroblastic proliferation with a few foreign body giant cells.

A preparation of oleic acid put up by Searle and Company was used and this appeared as though it would be good, but after about eight weeks it was impossible to find the area in which the solution had been injected. Various strengths of fluid extract of pinus canadensis, varying from 1 to 10 per cent, were used. These produced a very active proliferation immediately. Fibroblastic tissue appeared as early as the fourth day. However, there was necrosis, abscess, peritonitis and death in two dogs, so this was discarded. The fluid extract of pinus canadensis is one of the active ingredients in Mayer's solution.

There is one thing that has impressed me rather forcibly in the treatment of patients with any solution. All patients do not have the same rate of proliferation or absorption, after treatment. Occasionally in cases treated it seems as though the fibroblastic tissue simply disappears. It seems to be almost completely absorbed. It would be extremely interesting to have sections of these areas to see what actually has happened. This is a condition that is very often seen after hernias are operated upon. Suddenly the fascia begins to absorb and the hernia breaks out larger than the original, in the course of a few weeks.

We do not yet know what solution will be the best for this method of treatment. At the present time we have had the best results with proliferol, which is a distillate of vegetable tinctures. I believe it is a good plan to use a few injections of the thuja mixture with the proliferol solution, as it appears to give better and quicker results than when either is used alone. The best solution is going to be the one which will produce the most active proliferation of fibroblastic tissues with the least reaction, and which is the least dangerous.

There is no question but that great harm may result from improper use of any solution, and particularly so with the thuja mixture. I am greatly interested in the report which Dr. Rice has given on sylasol, and shall certainly try some of it and compare results with the proliferol solution.

DR. E. T. BELL: I have been very much impressed with the good results of this treatment. Dr. McKinney and Dr. Bratrud have secured an excellent result on two janitors in the Anatomy Building who had very large herniæ. The great advantage of the treatment is that tissue is formed where there was none before. You do not destroy any tissue but form scar tissue where it is needed to close the opening. It is sound from the pathological point of view. I do not understand the prejudice most of the surgeons have against the injection treatment; possibly they think that injection is a chiropractic treatment. There is no reason why this excellent non-surgical treament should be allowed to fall into the hands of irregulars.

DR. J. M. HAYES: I have been on service at the out-patient department at the University on alternate days with Drs. Bratrud and McKinney and have injected some herniæ almost from the beginning of their work. I have not become as enthusiastic over this work as they have, although I do not doubt that they are justified in their enthusiasm. For the patient who cannot afford to pay a hosnital bill, I am sure it is the treatment of choice for this condition. In private practice the patient who is able to pay a hospital bill frequently chooses to go in and have it over with rather than have the injections while he is carrying on with his work. Frequently the patient will forget to come back when the hernia ceases to come out but the opening is not sufficiently closed to prevent recurrence. I am pleased to see these men continue with this experimental work and aim to get a solution which will give maximum results with minimum chances of harmful sequelæ.

DR. HERBERT CARLSON (by invitation): I would like to ask Dr. Rice or Dr. Bell if they have any slides to show later development of this scar tissue. I have some slides to show in empyema that scar tissue replacing the pleura later becomes more delicate. That change might be an important factor in the recurrence of hernia.

DR. J. F. CORBETT: I would like to ask Dr. Rice a question as to the contraindications of the injection treatment?

DR. THEO. SWEETSER: Do you consider it rational to add one or more injections a few weeks after operation for hernia in cases wherein the tissue has been so attenuated as to make the strength of the repair doubtful?

DR. CARL O. RICE: In regard to Dr. Carlson's remarks, I have no information but I do not believe that the strong scar tissue which is seen in the histologic sections presented here would have a tendency to be subsequently absorbed.

Dr. Corbett asked what the contraindications were for the injection treatment of hernia. Any hernia which cannot be reduced or cannot be maintained with a truss cannot be treated by the injection treatment. A patient with a carcinoma, ascites, an undescended testicle or urinary retention, or its associated symptoms, should not be treated by this method.

We have treated a number of postoperative herniæ by this method and have obtained very good results but I do not believe that the addition of some of this irritating solution into the field of operation would add much to the curative results if the operation was not properly performed.

TUMORS SIMULATING CARCINOMA—SCHÜLLER-CHRISTIAN'S DISEASE OR XANTHOMATOSIS

W. A. Hanson, M.D., and L. H. Fowler, M.D.

The syndrome was reviewed and the following case was presented with lantern slides.

The patient was a female aged 50, who was referred to us by Dr. Norman Johnson, August, 1926, for the removal of a tumor of the right pectoralis region at the border of the upper quadrant of the breast, with the following complaints:

1. Insomnia and diplopia, at times associated with dizziness for the past six weeks.

2. Generalized headaches of intermittent character with "a whistling sensation" in the ears for the previous two months.

3. Pain of dull character over the precordium at intervals, not related to exercise and of variable duration.

4. Low backache with difficulty in stooping and standing. The complaint had been present as a child and gradually increased in recent years. Turning in bed was difficult and at times she was uncomfortable in bed. Fatigue would aggravate her backache so that at times she was unable to stand erect.

5. A peculiar hurting in the top of the head when stooping or leaning over; a sensation "like loose bodies in the head."

Family history.—Her mother and two maternal aunts had died from carcinoma of the uterus.

Past history.—Sleeping sickness as child and scarlet fever without complications at the age of eight years. Also as a child she had influenza complicated by peritonitis. A hysterectomy and appendectomy had been performed in 1919 and a hemorroidectomy in 1920.

Menstrual history.—The menses had started at the age of eleven years, and had always been regular, but excessive until cessation in 1919.

Physical examination.—The temperature was 98.6°, pulse 84 per minute. Her weight was 185 pounds and her height 5 feet 8 inches. The blood pressure registered 165 systolic and 110 diastolic in millimeters of mercury. The essential positive findings were: a dry scaly skin and enlarged tonsils. The abdomen was slightly tender in the right subcostal area, but no masses were made out. A small rather firm movable mass 1 x 1.5 inches in diameter was found at the border of the upper outer quadrant of the right breast in the pectoralis area. External hemorrhoids were present. The pelvic examination showed the cervix of normal size, soft and smooth. The motion of the spine appeared within normal limits with tenderness on palpation over the right sacroiliac joint.

Laboratory findings.—Repeated urine examinations were negative. The blood showed a hemoglobin of 75 per cent, r.b.c. 5,248,000 and the w.b.c. 9,300 and 8,000 per cubic millimeter with a normal differential.

X-rays of the skull and lumbar spine were made. These showed a destruction of the intervertebral disc between the forth and fifth lumbar space. The left sacroiliac joint showed a marked increased density with numerous striations in the crest of the ilium which

had the appearance of an osteoblastic carcinoma, probably from the breast. The skull showed areas of metastatic carcinoma.

Diagnosis.—Metastatic osteoblastic carcinoma of the fifth lumbar body and fourth disc, the left ilium and skull; or a possible Paget's disease.

Operation—Was performed August 12, 1936. The nodule at the border of the right breast was excised under general anesthesia without difficulty or incident. The tumor measured 1.5 x 2 cm., and was rather firm, uniform and encapsulated. Grossly on section this had the appearance of a lymph-node.

The pathological report was: metastatic carcinoma (Grade IV malignancy), cells of very embryonic character.

Follow-up record.—The patient's relatives were informed she had a carcinoma, although the sections did not impress us as a malignancy. She was also advised to have x-ray treatments to the skull and pelvis, which was not followed out.

August 8, 1930. There has been apparently no appreciable change since the previous examination except for a tenderness in the left jaw. An x-ray of the lumbar spine and pelvis showed the process to extend to the acetabulum while the skull showed the process diminished but still present.

May 23, 1932. She had gained eight pounds in weight. Pulse was 100 per minute and the blood pressure registered 180/110. The right pupil was larger than the left. There was also slight tenderness over the right sacroiliac joint area. She stated there had been pains over this area which radiated to the anterior lower quadrants of the abdomen and was aggravated by increased activity. At this time she informed us she had been running an unexplained fever for some time. X-rays of the pelvis and spine showed no change other than noted on the examination of August, 1930.

November 17, 1933. She stated she was comfortable only when lying on the right side during her attacks of pain. Since her attack of sleeping sickness she had had severe headaches, dizziness and occasional temperatures as high as 103°, as well as movements of her visual fields at times. The examination revealed no appreciable changes since the last checkup.

July 12, 1934. She reported her condition was about the same as previously and the laboratory reported her blood cholesterin as 147 milligrams per 100 c.c. and the skull, lumbar spine and pelvis with no apparent change.

Inasmuch as the clinical picture, x-ray and laboratory findings did not seem to warrant the diagnosis of malignancy a review of the sections of the tumor was requested of Dr. E. T. Bell of the Pathology Department of the University of Minnesota, who reported it to be that of xanthomatosis or Schüller-Christian's disease.

Summary

1. A case of xanthomatosis or Schüller-Christian's disease is reported and emphasizes the importance of reviewing microscopic sections previously obtained.

2. This is a rare disease, there being less than 60 cases reported in the literature, the exact etiology being unknown.

3. The disease progressed very little from the time she was first seen nine years ago, regardless of her not following instructions to have x-ray treatment of the skull and pelvis.

4. The whole picture is of a rather bizarre nature with typical skull findings, no diabetes insipidus or exophthalmos, but with lymph-node involvement, upon which the diagnosis was made. Relatively few cases have been reported with these findings.

5. The prognosis is better than that of carcinoma, the mortality being about 30 per cent, and the best results have been obtained by x-ray treatment of the involved areas.

6. We wish to acknowledge our appreciation for the coöperation of Dr. Norman Johnson, who referred the case, and Dr. E. T. Bell, who established the diagnosis of the exact pathological condition.

Discussion

DR. E. T. BELL: This case looks easy but it wasn't easy nine years ago when I first saw it. My first contact with this case was in 1926, when I examined an axillary lymph node which was sent to me by Drs. Fowler and Hanson. I diagnosed it a metastatic carcinoma, probably hypernephroma. In 1926 we knew nothing about Schüller-Christian's disease. As you will note, the lantern slides (slides shown) the resemblance to metastatic hypernephroma is close. The tissue was not stained for cholesterol, and only a paraffin block has been preserved.

I seem never to have satisfied Drs. Hanson and Fowler. Several years later they complained about the diagnosis, saying that the patient was well.

In 1934, eight years later, I reëxamined the slide and recognized it as Schüller-Christian's disease. The changes in the bones are also convincing evidence that this diagnosis is correct. We learn from our mistakes, which are often revealed by follow-up studies.

I have not seen any reports of lesions in lymph-nodes. Some of the cases are severe, but others run a mild clinical course, such as the patient under discussion. X-ray treatment of the involved area is sometimes quite successful.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for September

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 11:15 a. m. every Tuesday over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

September 3—Foreign bodies in the eye.

September 10—Prenatal care.

September 17—Ticks and disease.

September 24—Women in cancer education.

Inter-State Postgraduate Medical Association of North America

The International Assembly of the Inter-State Postgraduate Medical Association of North America will be held in the beautiful Masonic Temple, Detroit, Michigan, October 14, 15, 16, 17 and 18, 1935, with pre-assembly clinics on Saturday, October 12, and post-assembly clinics Saturday, October 19, in the Detroit Hospitals.

The Association through its officers and members of the program committee extends a very cordial invitation to all physicians in good standing in their State and Provincial Medical Societies to attend the Assembly. An unusual clinical and didactic program including all branches of medicine and surgery and the specialties has been arranged by the program committee.

In coöperation with the Wayne County Medical Society and the Michigan State Medical Society and with the active support of the Detroit Convention and Tourist Bureau and the Detroit Board of Commerce, a most excellent opportunity for an intensive week of postgraduate medical instruction is offered by a very large group of acknowledged leaders in the profession.

With a great deal of pride and satisfaction, we call your attention to the list of distinguished teachers and clinicians who will take part on the program, which appears on page xxvi of the advertising section of this journal.

Registration fee of $5.00 admits all members of the profession in good standing.

DR. CHARLES H. MAYO, President, Rochester, Minn.

DR. GEORGE CRILE, Chairman Program Committee, Cleveland, Ohio.

DR. WILLIAM B. PECK, Managing-Director, Freeport, Ill.

Seventh Annual Training Course for Medical Reservists at the Mayo Clinic

The two weeks' period, October 6 to 20, 1935, has been selected for the Seventh Annual Training Course for Medical Department Reservists of the United States Army and Navy, at the Mayo Clinic, Rochester, Minnesota.

These training courses at the Mayo Clinic were inaugurated by the Seventh Corps Area to give military training to the young Medical Corps Reserve Officers on the staff of that institution, who could not attend summer camps. It developed that Reservists not connected with the Clinic desired to attend. It was noted that, inasmuch as the military work was given in the afternoon and evening hours, these men were able to attend the strictly professional presentations by the staff of the Mayo Clinic during the morning hours. In recent years, special professional presentations have been arranged as a regular part of the course.

The program will follow the plan which has been so successful in past years. The morning hours will be devoted entirely to professional work in special clinics and study groups. Officers in attendance may select the course they wish to follow from the wide variety of presentations offered. The afternoons and evenings will be devoted to Medico-Military subjects.

The Staff and Faculty of the Mayo Clinic will present the professional training, while the Medico-Military Program will be under the direction of the Surgeon of the Seventh Corps Area (Army) and the Surgeon of the Ninth Naval District (Navy).

Enrollment is open to all Army and Navy Reservists of Medical Departments, in good standing. Applications should be submitted to the Surgeon, Seventh Corps Area, Omaha, Nebraska, or the Surgeon, Ninth Naval District, Great Lakes, Illinois—Enrollment is limited to two hundred.

The Surgeon Generals of the Army, the Navy and the Public Health Service, have all signified their desire and intention of being present during at least a portion of the course.

Mississippi Valley Medical Society

The first annual meeting of the newly formed Mississippi Valley Medical Society will be held at Quincy, Ill., October 2, 3, 4. The meeting and commercial exhibit will be held in the new and thoroughly modern Lincoln-Douglas Hotel. There will be morning, afternoon and evening sessions of a most practical character. The entire program is arranged to appeal especially to the general practitioner.

Among the eminent clinicians on the program are:

Isaac A. Abt, M.D., Prof. of Pediatrics, Northwestern University School of Medicine.

Fred H. Albee, M.D., Prof. of Orthopedic Surgery, New York Post-Graduate Medical School and Hospital.

W. Wayne Babcock, M.D., Prof. of Surgery, Temple University School of Medicine.

Hugh Cabot, M.D., Prof. of Surgery, University of Minnesota Graduate School of Medicine.

Arthur C. Ernstene, M.D., Cardiologist, Cleveland Clinic.

Frederick A. Figi, M.D., Assoc. Prof. of Laryngology, University of Minnesota Graduate School of Medicine.

Thomas E. Jones, M.D., Gynecologist, Cleveland Clinic.

Wm. C. MacCarty, M.D., Prof. of Pathology, University of Minnesota Graduate School of Medicine.

Albert Soiland, M.D., Chairman, Malignancy Board, California Hospital of Los Angeles.

These men will each give two or three practical lectures or clinical demonstrations and will be assisted by twenty-seven specialists from Illinois, Missouri and Iowa who will conduct a clinical lecture course. There will be a total of over fifty lectures and demonstrations during the three day session. All ethical physicians are cordially invited to attend the meeting. A detailed program may be obtained from Harold Swanberg, M.D., Secretary-Treasurer, 211-224 W. C. U. Bldg., Quincy, Illinois.

"Contacts"

Hennepin County Tuberculosis Association

Emphasizing the rôle of the family physician in dealing with the problem of tuberculosis in an average American home, "Contacts," the new motion picture produced by the Hennepin County Tuberculosis Association and the Department of Visual Education at the University of Minnesota, is now available for use throughout Minnesota.

The picture shows the physician dealing with a case of miliary tuberculosis in a child. Subsequently, he goes into action to trace the infection back to its source. Both in caring for the family during the time of the illness and in protecting other members of the family and the community from further infection, he has the stellar part in the tragic little drama.

"Contacts," which is now being requested for nation-wide use, has the distinction of being the first health picture ever made with sound and music. Incidentally, it is the first new film in the tuberculosis cause in three years.

Favorable comments which have recently been received from members of the medical profession and public health leaders are especially enthusiastic about the appeal the film has for audiences of every type, children as well as adults, both lay and professional groups, and the fact that its simple, human story is equally applicable anywhere. Its lesson is of the widest application and is readily understood. Many have emphasized the thoroughness with which the picture covers the facts on tuberculosis prevention which the layman needs for self protection, making it a most valuable medium of health education.

The film has recently been revised and extended and now includes a dramatic sequence, "Modern Weapons for the Control of Tuberculosis," which reviews in a striking and effective parade such factors as the tuberculin skin test, the x-ray, the methods of resting the lung, sanatorium treatment, et cetera.

Arrangements for showing the film may be made through the Hennepin County Tuberculosis Association or the Minnesota Public Health Association. Physicians who wish to have the picture shown before any groups with which they are affiliated may arrange for it by calling or writing to either of the above organizations.

Biological Photographic Association

The fifth convention of the Biological Photographic Association, including those interested in medical illustrations in general, will be held at the Stevens Hotel, Chicago, September 12, 13 and 14, 1935. Registration will begin at 8:30 A. M., September 12.

The two and one-half days program includes lantern slide projections, intragastric photography, ocular photography, microcinematography and scientific moving pictures. The banquet is scheduled for September 13.

Ralph P. Creer, Hines, Illinois, is chairman of the program committee.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

ELECTROTHERAPY AND LIGHT THERAPY. Richard Kovacs, M.D., Clinical Professor and Director of Physical Therapy, Polyclinic Medical School and Hospital, New York. 696 pages. Illus. Price $7.50. Philadelphia: Lea and Febiger, 1935.

This second edition of Kovacs' book is an excellent reference manual for anyone who is interested in gaining an understanding of the principles underlying physical therapy. Each subject is preceded by an excellent and concise presentation of the elementary physics underlying it. This is followed by a description of the modality, its production, physics, physiology, technic of application, indications, and contra-indications. The final section, consisting of eleven chapters, is devoted to applied electrotherapy and light therapy, and discusses by diseases the physical measures used in their treatment.

Dr. Kovacs is a well known and highly regarded electrotherapist, and apparently has tried to present in this work only treatments for which there is a definite scientific basis or which have been proved effective by extensive clinical use. I believe the book can be recommended as one of the outstanding works on this subject.

MILAND E. KNAPP, M.D.

ILLUSTRATIVE ELECTROCARDIOGRAPHY. Joseph H. Bainton, M.D., Attending Physician and Chief of Cardiac Clinic, Morrisania Hospital, New York, and Julius Burstein, M.D., Associate Electrocardiographer, Morrisania Hospital. 258 pages. Illus. Price, $5.00. New York: D. Appleton-Century Co., 1935.

As its name implies, this book is a collection of electrocardiograms tending to illustrate the different forms of pathology which it is possible to demonstrate by this means.

The subject matter is divided into fifteen groups, starting with normal electrocardiograms and then showing tracings grouped according to different forms of heart pathology. Throughout the book each plate is well explained by a suitable paragraph or two. The book is quite up to date and makes an excellent reference work with the possible exception that information from four lead tracings tending to diagnose the location of a coronary occlusion is not given.

The book is very worthwhile for anyone who is attempting to familiarize himself with the reading of electrocardiograms.

M. A. SHILLINGTON, M.D.